Message

From: Joe C [tjoec@live.com]
Sent: 6/22/2017 3:53:34 PM
To: Jefferson, Catrice [Jefferson.Catrice@epa.gov]
Subject: Re: Both of Robert's Studies

Please forward these documents to the head of the EPA. We are asking him to force the shut down of this wind farm until they can find a way not to harm us. Our local and state officials said they cannot do anything. Cindy Cobb

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From: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Sent: Thursday, June 22, 2017 9:00 AM
To: Ex. 6 Personal Privacy (PP)
Subject: RE: Both of Robert's Studies

Good Morning Mr. Cobb,

Thank you for your message below regarding noise pollution from wind turbines. I understand your concerns about the noise that wind turbines generate and the adverse effects on health and well-being.

I spoke with Cindy about two weeks ago and informed her that the EPA noise program was discontinued over thirty years ago, and the EPA Office of Noise Abatement and Control (ONAC) was closed in 1982. As a result, the EPA no longer has an active noise program that would allow us to address noise concerns. I would encourage you and your neighbors to contact your state and /or local government, which may have programs and information related to noise pollution control. Here is the link to the Department of Public Health and Environment in Colorado -- https://www.colorado.gov/cdphe.

Department of Public Health and Environment

www.colorado.gov

Regulates environmental health and safety and compiles vital statistics (birth, death, and health) for the state of Colorado.

If you have additional questions, please feel free to contact me.

Catrice

From: Joe C [mailto Ex. 6 Personal Privacy (PP)
Sent: Thursday, June 15, 2017 1:44 PM
To: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Subject: Fw: Both of Robert's Studies

Here is our infrasound study to show that it is penetrating our homes and Robert Rand's report showing how the noise is breaking our county and state laws. This is noise pollution that needs to stop. It is destroying our health, ability to sleep and our quality of life. Please help us! Someone in the EPA should be able to do

something to stop wind turbines. They are producing audible and inaudible noise that is hurting the residents. We do not want to die. Due to lack of quality sleep, it is causing health issues. please call us at 719-541-5249.
Joe and Cindy Cobb
Calhan, Colorado

From: Gavin [Ex. 6 Personal Privacy (PP)]
Sent: Monday, May 15, 2017 2:05 PM
To: Joe C
Subject: Both of Robert's Studies

Joe,

Attached are both of Robert's studies.

Gavin

Message

From: Jefferson, Catrice [Jefferson.Catrice@epa.gov]
Sent: 8/22/2017 11:56:04 AM
To: Jefferson, Catrice [Jefferson.Catrice@epa.gov]
Subject: FW: Both of Robert's Studies

From: Jefferson, Catrice
Sent: Tuesday, August 22, 2017 7:51 AM
To: 'Joe C' Ex. 6 Personal Privacy (PP)
Subject: RE: Both of Robert's Studies

Good Morning Ms. Cobb,

Per our previous conversations, you are welcome to contact the EPA Administrator. This link contains Administrator Pruitt's contact information -- https://www.epa.gov/aboutepa/epas-administrator. There is a "contact us" link at the bottom of the web page if you prefer to submit your concerns via email.

If you have trouble accessing the link or other questions, please let me know.

Have a great day.

Catrice

From: Joe C Ex. 6 Personal Privacy (PP)
Sent: Monday, August 21, 2017 9:42 AM
To: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Subject: Re: Both of Robert's Studies

I need the name and phone number of the person highest in rank that I can speak too. We need this stopped as we don't want to die. this is a serious situation. Our local and state people are being paid by the turbine company to ignore what's happening to us. We need Federal help.
Cindy

From: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Sent: Thursday, June 22, 2017 9:00 AM
To: Ex. 6 Personal Privacy (PP)
Subject: RE: Both of Robert's Studies

Good Morning Mr. Cobb,

Thank you for your message below regarding noise pollution from wind turbines. I understand your concerns about the noise that wind turbines generate and the adverse effects on health and well-being.

I spoke with Cindy about two weeks ago and informed her that the EPA noise program was discontinued over thirty years ago, and the EPA Office of Noise Abatement and Control (ONAC) was closed in 1982. As a result, the EPA no longer has an active noise program that would allow us to address noise concerns. I would encourage you and your neighbors to contact your state and /or local government, which may have programs and information related to noise pollution control. Here is the link to the Department of Public Health and Environment in Colorado -- https://www.colorado.gov/cdphe.

Department of Public Health and Environment

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Regulates environmental health and safety and compiles vital statistics (birth, death, and health) for the state of Colorado.

If you have additional questions, please feel free to contact me.

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Sent: Thursday, June 15, 2017 1:44 PM
To: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Subject: Fw: Both of Robert's Studies

Here is our infrasound study to show that it is penetrating our homes and Robert Rand's report showing how the noise is breaking our county and state laws. This is noise pollution that needs to stop. It is destroying our health, ability to sleep and our quality of life. Please help us! Someone in the EPA should be able to do something to stop wind turbines. They are producing audible and inaudible noise that is hurting the residents. We do not want to die. Due to lack of quality sleep, it is causing health issues. please call us at 719-541-5249.
Joe and Cindy Cobb
Calhan, Colorado

From: Gavin <[Ex. 6 Personal Privacy (PP)]
Sent: Monday, May 15, 2017 2:05 PM
To: Joe C
Subject: Both of Robert's Studies

Joe,

Attached are both of Robert's studies.

Gavin

Message

From: Joe C Ex. 6 Personal Privacy (PP)
Sent: 12/15/2017 6:13:04 PM
To: Jefferson, Catrice [Jefferson.Catrice@epa.gov]
Subject: Re: Both of Robert's Studies

Nothing. is what he said. There is an Environmental Protection Agency Act, No. 20 is Noise control. We feel he is ignoring the laws you have in place for noise. As there are several.

From: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Sent: Friday, December 15, 2017 9:15 AM
To: Joe C
Subject: RE: Both of Robert's Studies

What did Mr. Archuleta state that could be done to assist with your noise matter?

From: Joe C Ex. 6 Personal Privacy (PP)
Sent: Friday, December 15, 2017 9:44 AM
To: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Subject: Re: Both of Robert's Studies

The noise issues are now classified under the air pollution. We have talked to Richard Archuleta who says he is from the EPA and he won't do anything for us (even though he can)
Cindy Cobb

From: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Sent: Friday, December 15, 2017 7:36 AM
To: Joe C
Subject: RE: Both of Robert's Studies

Good Morning Mr. Cobb,

I am sorry to hear that you are still being impacted by the noise from the wind farm near your home. As stated in my previous message below, the U.S. EPA no longer has a noise program and look to State and local government to address related matters. However, if you prefer to address your concerns with the Administrator, please write him at Pruitt.scott@epa.gov.

Best regards,
Catrice

From: Joe C Ex. 6 Personal Privacy (PP), plea
Sent: Thursday, December 14, 2017 4:10 PM
To: Jefferson, Catrice Jefferson.Catrice@epa.gov
Subject: Re: Both of Robert's Studies

Catrice, the Colorado Dept. of Public Health will not reply to our emails or calls. We now have documentation that this wind farm is affecting our cortisol levels. the normal cortisol level is in the single digits for humans

(ours are in the 30's and 50's) dangerous levels. It is also affecting our animals. Tested one of our mini horses. Normal level for it is 25. Her number came back 127. So this wind farm is causing so much stress that our cortisol levels are 5 times higher than normal (same with our animals). Please send this information to Scott Pruitt. Something must be done to help us. Please!

From: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Sent: Thursday, June 22, 2017 9:00 AM
To: Ex. 6 Personal Privacy (PP)
Subject: RE: Both of Robert's Studies

Good Morning Mr. Cobb,

Thank you for your message below regarding noise pollution from wind turbines. I understand your concerns about the noise that wind turbines generate and the adverse effects on health and well-being.

I spoke with Cindy about two weeks ago and informed her that the EPA noise program was discontinued over thirty years ago, and the EPA Office of Noise Abatement and Control (ONAC) was closed in 1982. As a result, the EPA no longer has an active noise program that would allow us to address noise concerns. I would encourage you and your neighbors to contact your state and /or local government, which may have programs and information related to noise pollution control. Here is the link to the Department of Public Health and Environment in Colorado -- https://www.colorado.gov/cdphe.

If you have additional questions, please feel free to contact me.

Catrice

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Sent: Thursday, June 15, 2017 1:44 PM
To: Jefferson, Catrice <Jefferson.Catrice@epa.gov>
Subject: Fw: Both of Robert's Studies

Here is our infrasound study to show that it is penetrating our homes and Robert Rand's report showing how the noise is breaking our county and state laws. This is noise pollution that needs to stop. It is destroying our health, ability to sleep and our quality of life. Please help us! Someone in the EPA should be able to do something to stop wind turbines. They are producing audible and inaudible noise that is hurting the residents. We do not want to die. Due to lack of quality sleep, it is causing health issues. please call us at 719-541-5249.
Joe and Cindy Cobb
Calhan, Colorado

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Sent: Monday, May 15, 2017 2:05 PM
To: Joe C
Subject: Both of Robert's Studies

Joe,

Attached are both of Robert's studies.

Gavin

Robert W. Rand, ASA, INCE
RAND ACOUSTICS, LLC
1085 Tantra Park Circle
Boulder, CO 80305

E-mail: rrand@randacoustics.com
Telephone: 207-632-1215

March 21, 2017

El Paso Board of County Commissioners
200 South Cascade Avenue, Suite 100
Colorado Springs, CO 80903-2202

Re: Review of Epsilon Report 4177 October 7, 2016
Golden West Wind Energy Center El Paso County, Colorado

Per request of neighbors in Calhan, Colorado, I respectfully submit this review of the Sound Level Compliance Evaluation Report for the Golden West Wind Energy Center El Paso County, Colorado prepared by Epsilon Associates, Inc. for NextEra Resources, LLC dated October 7, 2016. I found *errors and omissions*. Professional opinions are provided below.

1. The report does not fulfill the requirements of Resolution No. 15-55 Section 17. Section 17 required "*an additional noise impact study, which shall evaluate the actual noise impacts of the project during operation*". The Epsilon Report ignores complaints of noise disturbance registered with the County and/or facility, and omits noise level and character assessments against relevant noise criteria [1].

2. The Epsilon Report disregards Colorado State Statute ARTICLE 12 – NOISE ABATEMENT, C.R.S. Sections 25-12-101 to -110, "Noise in excess of the limits provided in this article [*note: 45 dBA at night for periodic noise*] constitutes a public nuisance."

3. The Epsilon Report does not assess for noise disturbance despite apparent neighbor complaints of noise disturbance. Noise disturbance is prohibited by the County Ordinance No. 02-1, Section 3(e) and Section 4(a).

4. The Epsilon Report's data confirm the presence of intrusive facility noise levels exceeding the Colorado Statute Article 12, 45 dBA noise limit for periodic noise, establishing periodic noise levels a public nuisance at some 23 non-participating properties with dwellings.

5. The Epsilon Report provides *prima facie evidence* that the Golden West Facility wind turbine noise *is a public nuisance* under State law[2] yet neglects to inform the reader.

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1 To assess for noise impacts, noise levels and character should be compared to accepted noise criteria associated to adverse impacts on people. Epsilon omitted noise impact assessment. Exceeding known criteria for public nuisance and sleep disturbance but omitting notification, could result in prolonging noise impacts and disturbance such as sleep deprivation, activity interference, or reduced enjoyment of property. Such
2 Colorado C.R.S. Section 25-12-103.

6. The Report does not corroborate that all turbines were operating at full power/acoustic output. Experience at other facilities has shown some turbines operated at lower output during testing which can reduce total noise levels at a measurement location. **The Report as submitted does not represent worst case conditions.**

7. The Epsilon Report attests no non-participating property "will be exposed to sound levels over 50 dBA". This is contradicted by the Report's data exceeding 50 dBA some portion of the time at several non-participating property line locations. Example, the L10 noise level, exceeded 10 percent of the time, may equate to 36 days per year above regulatory limits.

8. Location 7 appears farther away from the nearest Turbine #55 (710 ft) than the nearest non-participating property line (~480 ft based on scaled Epsilon figure). The distance to the Location 7 assures noise levels from Turbine #55 are under-represented by 3 dB.

9. The Epsilon Report removes unattended averaged data over 50 dBA with a dismissive attribute for contamination from non-turbine noise sources. Not a valid assumption without witnessing, observers, recordings, hence no basis to consign to non-turbine noise sources.

10. Noise levels of 40 dBA and higher, per ANSI S12.9 Part 5, are ***incompatible*** with rural land use [***Epsilon knowledge***, footnote 3]. Noise impact assessment absent in Epsilon Report.

11. Noise levels of 40 dBA at night ***exceed*** WHO 2009 thresholds of noise effects on people [***Epsilon knowledge***, footnote 4], **assuring sleep disturbance**. Noise impact assessment was not found in the Epsilon Report. **Epsilon omitted assessment of Golden West noise impacts on children, chronically ill and elderly.**

12. Even wind industry consultants documented, noise levels over 40-45 dBA are associated with ***complaints such as sleep disturbance*** [5]. However, the Epsilon Report was mute.

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3 Note: Epsilon's Founder and Senior Consultant Robert Hellweg was Chair for the ANSI Accredited Standards Committee for S12.9 which determines noise source compatibility for various land uses. ANSI standards are widely recognized as standards of good practice internationally.

4 Note: Epsilon's Founder and Senior Consultant Robert Hellweg invoked the WHO 2009 40 dBA,night guideline as an impact criterion in his report, "Review and analysis of the noise impact of the proposed new heliport pad at CHUV as contained in the PAC 315 Report on Environmental Impact (RIE)" dated June 24, 2012, stating, "*The CHUV heliport noise at nighttime now exceeds ... the WHO Europe target value for Lrnight(8hrs) of 40 dBA for nighttime noise to protect the public, especially the most vulnerable groups, such as children, the chronically ill and the elderly*".

5 Robert McCunney, Kenneth Mundt, W. Colby, et al, "Wind Turbines and Health: A Critical Review of the Scientific Literature", Journal of Occupational and Environmental Medicine, November 2014 - Volume 56 - Issue 11 - p e108–e130. Accessed March 10, 2017.

Summary of review:

Contrary to the permitting requirement, the Epsilon Report neglected to assess noise impacts. County, State, and professional noise impact criteria were omitted.

The Epsilon Report substantiates that the Golden West facility noise exceeds predicted noise levels, and exceeds County and State noise limits, while not confirming maximum output for all turbines during testing (noise levels may go higher than Epsilon measured). The Epsilon Report should not be considered protective of public safety, health and welfare, and departs from accepted professional practice.

Epsilon's noise measurements clearly confirm why neighbors complain.

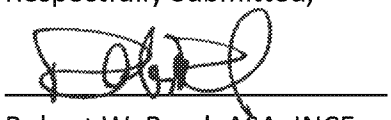
Experience has shown that when there are noise complaints during normal operation, this reveals that the designers, consultants and regulators have failed to meet their public protection responsibilities.

The Epsilon Report ignores law and does not assess complaints or impacts. Who benefits?

My professional experience says this facility should not have been permitted with turbines this large and this close to non-participating residential properties. The Epsilon Report shows the noise levels do not always comply with law and are consistent with noise disturbance. The law, were it to be enforced, requires the facility noise levels to be reduced.

Thank you for your consideration of this review letter. If you have any questions, please contact me.

Respectfully Submitted,



Robert W. Rand, ASA, INCE

1. Documents Reviewed

The following documents were reviewed for this letter.

- Sound Level Compliance Evaluation Report, Epsilon Report 4177 October 7, 2016
- County of El Paso, CO Board of County Commissioners Resolution No. 15-55
- El Paso County "Ordinance Concerning Noise Levels" No. 02-1 dated 8/15/2002
- Colorado Revised Statutes – Article 12 – Noise Abatement, Sections 25-12-101 to -110
- "Noise Study Update", Golden West Energy Project, Energy Renewal Partners, LLC, prepared for Golden West Power Partners, LLC as a subsidiary of NextEra, Version 2, 12/2/14
- Document dated 1/6/2015, from Craig Dossey, Project Manager III, and Richard Harvey, Engineer III, to El Paso County Planning Commission, Tim Trowbridge, Chair.

2. Review Methodology

This review analysis was based in part on relevant American National Standards Institute (ANSI) standards, sufficient evidence compiled by the World Health Organization on the effects of noise on people, the ISO 9613-2 standard, the Colorado State and County noise regulations, and on years of experience evaluating predictive models and validating by measuring operating noise levels for power generation and wind turbine facilities.

Opinions are given to a reasonable degree of scientific certainty. These opinions are based on professional experience and the information available at the time of drafting this report. I reserve the right to supplement or revise should additional information come to light.

By my professional ethics, I hold paramount the safety, health and welfare of the public. These are the same stringent ethical requirements as for registered professional engineers. I'm aligned in practice to the National Society of Professional Engineers (NSPE) who take seriously their responsibility for the safety and well-being of the public. Institute of Noise Control Engineering (INCE) Members are required to approve only noise control engineering studies, reports, or work which, to the best of their knowledge and belief, is safe for public health, property, and welfare and in conformance with accepted practice.

3. Review Details

Review Detail Sections:

3.1 The Epsilon Report ignored and omitted Colorado State Statute ARTICLE 12 – NOISE ABATEMENT

Originating in 1981 and continuously reaffirmed through 2016, Colorado State Statute Article 12 established A-weighted noise limits associated to noise nuisance [6]. By legislative declaration,

> *"The general assembly finds and declares that noise is a major source of environmental pollution which represents a threat to the serenity and quality of life in the state of Colorado. Excess noise often has an adverse physiological and psychological effect on human beings, thus contributing to an economic loss to the community. Accordingly, it is the policy of the general assembly to establish statewide standards for noise level limits for various time periods and areas. Noise in excess of the limits provided in this article constitutes a public nuisance."*

The State's maximum permissible noise levels are listed below.

25-12-103. Maximum permissible noise levels.

(1) Every activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of twenty-five feet or more therefrom in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

(2) In the hours between 7:00 a.m. and the next 7:00 p.m., the noise levels permitted in subsection (1) of this section may be increased by ten db(A) for a period of not to exceed fifteen minutes in any one-hour period.

(3) Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of five db(A) less than those listed in subsection (1) of this section.

The maximum permissible noise levels for residential use are essentially the same as found in the El Paso County Noise Ordinance 02-1, including a baseline night noise limit of 50 dBA. However, the State Statute 25-12-103(3) (outlined) defines public nuisance: "*Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of five db(A) less than those listed in subsection (1) of this section.*"

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6 Retrieved from http://www.lexisnexis.com/hottopics/colorado/ March 7, 2017.

Industrial wind turbines are ubiquitously considered periodic noise sources by wind industry and others due to their design with three blades sweeping in rotation, encountering wind shear, turbulence, blade-tower interaction [numerous references include 7,8,9,10,11,12].

The State Statute Article 12 limits noise from periodic-noise sources such as large industrial wind turbines to 50 dBA minus 5 dB, a maximum permissible noise level of 45 dBA at night.

Legislative Council confirmed the Article 12 Section 25-12-101 to -110 is in effect [13].

A question could arise as to whether the Epsilon Report may have taken an assumption that the El Paso County Ordinance 02-1 preempts State Law. However county preemption is not supported. The General Assembly declaration of statewide noise standards "should be afforded deference" [14].

Further as stated by Colorado Counties, Inc. [15], "Traditionally counties have been

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7 Leventhall, G. et al, "periodic rise in level is also referred to as amplitude modulation", Wind Turbine Sound and Health Effects An Expert Panel Review, Prepared for: American Wind Energy Association and Canadian Wind Energy Association, December 2009. http://canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_-Health_Effects.pdf accessed March 16, 2017.

8 Xu et al, "the periodic low frequency noise due to blade rotation", Modeling and Conputation of Wind Turbine Low-Frequency Noise Generation and Scattering, https://arc.aiaa.org/doi/abs/10.2514/6.2005-1189 accessed March 16, 2017.

9 Harrison, J., "the characteristic periodic or impulsive sound of a turbine", Disconnect Between Turbine Noise Guidelines and Health Authority Recommendations, http://citeseerx.ist.psu.edu/viewdoc/summary?-doi=10.1.1.490.5087, accessed March 16, 2017.

10 Hessler, H., "described as a churning, mildly periodic sound due to blade swish", Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects. The National Association of Regulatory Utility Commissioners (NARUC), October 2011.

11 Zajamsek, B. et al, "Amplitude modulation (periodic variation)", Infrasound and Low-Frequency Noise from Wind Turbines, FSSIC2015, Perth, July 2015, DOI: 10.13140/RG.2.1.3826.5049 accessed March 20, 2017.

12 Google Patent, "As prior art blades entered and exited the tower shadow in the plane that is downwind of the tower without such sequential entrance and exit of portions of each blade, the relatively abrupt change in wind speed created an impulsive change in the blade's angle of attack, which resulted in a periodic noise being generated by the blades passage through the tower shadow. " https://www.google.co.in/patents/-WO2007011862A2 accessed March 7, 2017.

13 Telephone communication, March 16, 2017.

14 Colorado General Assembly LegiSource, https://legisource.net/2011/11/03/when-can-a-local-government-override-state-law-home-rule-cities-in-colorado/ accessed March 20, 2017. "*The General Assembly's declaration that an issue is a matter of statewide or local concern is not conclusive but should be afforded deference in recognition of the legislature's authority to declare public policy of the state in matters of statewide concern. Town of Telluride, 3 P.3d at 37 (citing City and County of Denver v. State, 788 P.2d at 768 n. 6 (noting that the General Assembly's declaration is not binding)). It is not up to the courts to make or weigh policies. Id. at 38. Thus, when sufficient state interests are implicated, an issue that also implicates local interests is still a matter of mixed local and statewide concern. Id.*"

15 Colorado Counties, Inc., http://ccionline.org/counties/ accessed March 20, 2017.

considered to be a subdivision of state government existing to administer state programs at a local level." Additionally, El Paso County is not a home rule county.

As defined in Statute Article 12, Section 25-12-102(6), '*"Residential zone" means an area of single-family or multifamily dwellings where businesses may or may not be conducted in such dwellings'*. "Residential" is typically used to contrast with Commercial and Industrial use where people do not live. In the area of the Golden West facility, the residential use of dwellings on properties appears consistent with the literal wording of this definition.

Indeed, the El Paso County Noise Ordinance 02-1.3(j) agrees, defining residential property as, "... *any property which is occupied by a residence*, whether it be a single family, two-family or multi-family dwelling, or a mobile, manufactured or modular home, which is located within *any* zone district allowing a residence as a permitted principal use as set forth in the El Paso County Development Code, as amended." (emphasis added). The El Paso County Agricultural zoning assigned to most of the area near the Golden West facility allows a residence as a permitted principal use.

Contrary to the State Article 12, the County Ordinance 02-1 omits the 5-decibel penalty for periodic, impulsive or shrill noises. For periodic-noise sources such as large industrial wind turbines, the County Ordinance is more permissive than the State Statute by five decibels. The State Statute is more stringent.

> *In thirty-seven years of professional work, I have never seen a regulatory authority or governing body permit a permissive standard to take precedence over a more stringent standard.*

No statement was found in the Epsilon Report, nor anywhere else, defining that the County Noise Ordinance 02-1 shall or has been determined to supercede, replace or render moot the regulatory authority of State Statute Article 12 Sections 25-12-101 to -110. Neither is any support found for the County Noise Ordinance to be superceded.

The conclusion is that 1) the State Statute Article 12 stands along with the County Ordinance 02-1 as concurrent regulatory requirements for the Golden West facility, and 2) the Epsilon Report was in error to exclude it.

> *It appears the County, the applicant/owner, and Epsilon all chose to omit assessment of the facility noise under State Statute Article 12. No mention is found in the Epsilon Report, the Golden West permit, nor any of the County documents reviewed.*

3.2 Epsilon Report data confirm facility noise levels exceeded Colorado Statute Article 12, 45 dBA noise limit for periodic noise, at most locations

Epsilon Report noise data were compared to the noise levels predicted for the project. Almost all locations appeared selected where predicted "mean" noise levels were 48 dBA.

Epsilon reported Leq "average" levels at or close to 50 dBA at many locations. Average levels at 50 dBA mean that half or a significant portion of the time, the noise source is over 50 dBA. Epsilon discarded data and adjusted data above 50 dBA with results at 50 dBA or less. **Unattended non-witnessed data should not be discarded or adjusted speculatively as due to another noise source. That is not considered good professional practice.**

L10 intrusive levels (10 percent of the time) measured above 50 dBA at five locations, and above 45 dBA at all locations except the distant non-property-line Location 15.

Measured average noise levels exceeded predicted average noise levels at the majority of locations. Data were sparse at several locations, limiting confidence in the results.

Location	Nearest IWT	Dist, ft	Predicted, (Mean) dBA	Measured, Leq (Average)	Measured, Lmax	Measured, L10
1	142	880	*48*	45-55	48-76	46-48
2	122	810	*48*	48-56	51-81	49-52
3	102	820	*49*	48-49	52-68	49-50
4	94	1070	*48*	47-48	51-59	48-50
5	85	1340	*46*	48-50	54-62	49-52
6	70	890	*47*	45-49	48-57	47-50
7	55	710	*48*	46-48	48-63	47-49
8	33	990	*48*	48	59-63	49
9	36	1140	*48*	49-50	55-67	51-52
10	37	1100	*48*	49-50	52-60	50-52
11	7	1470	*48*	46	48-51	46-47
12	27	960	*48*	46-50	52-71	46-52
13	144	840	*47*	44-45	53-55	45-46
14	82	1320	*46*	45	53-58	46
15	83	3960	*37*	29-38	34-46	30-39

Table 3.2.1. Epsilon measurement locations, nearest turbine (IWT) and distance to turbine, predicted Leq "average" noise levels and, noise levels measured by Epsilon, Leq (the energy-equivalent or "average" sound level), Lmax (the highest noise level) and L10 (the noise level exceeded only (present) 10 percent of the time. The data listed here are taken from the various tables in the Epsilon report. *The L10 is typically associated to intrusive noise sources and may be considered representative of periodic "whoosh" and "whoomp" noises emitted from wind turbine blades during rotation from faster winds at top to slower winds below.*

3.3 Epsilon Report data confirm predicted noise levels above 45 dBA that would constitute a noise nuisance per State Statute Article 12.

Figure 3.3-1 shows facility predicted 45 dBA and higher noise footprint (red).

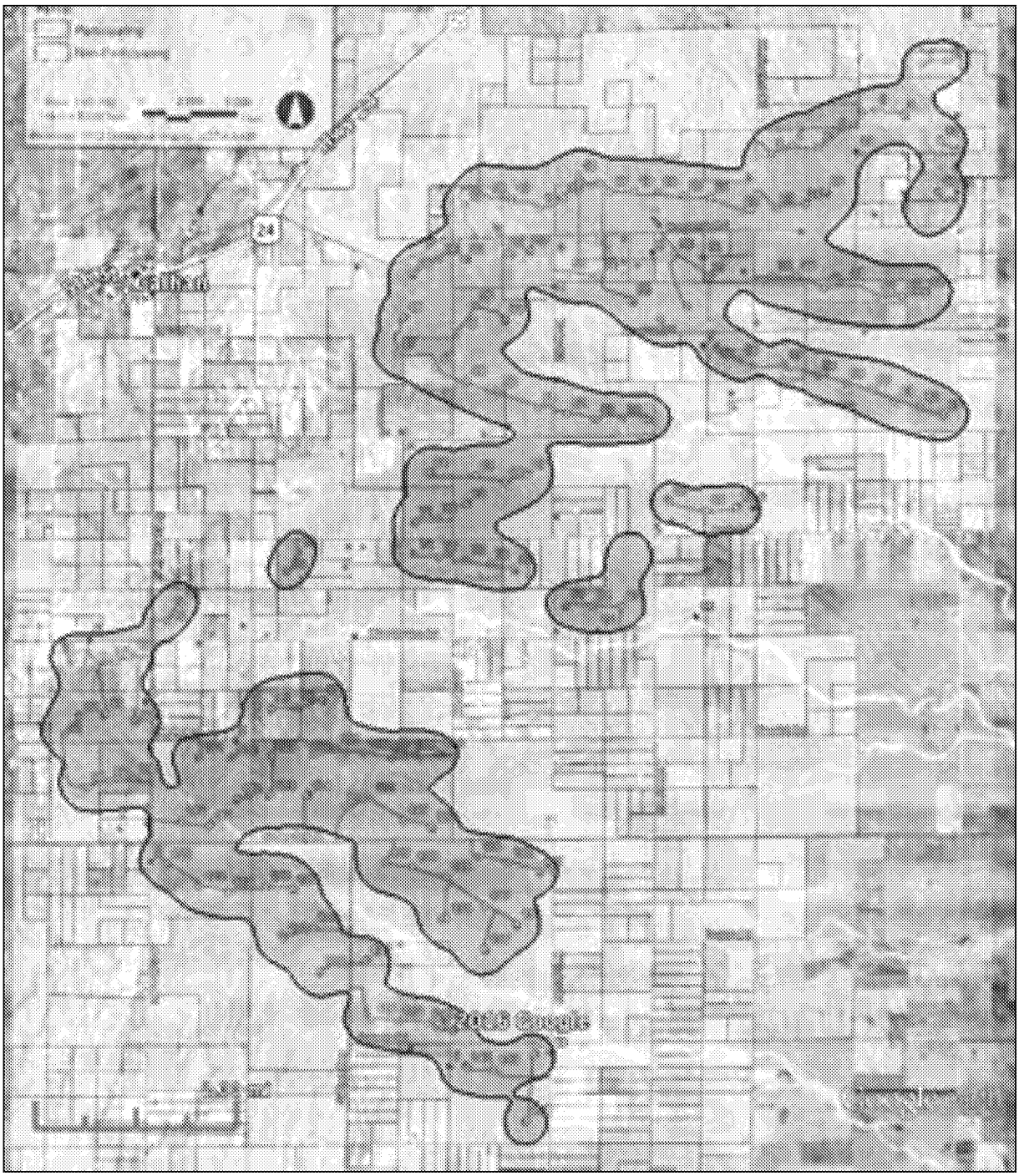

Figure 3.3-1. Golden West facility noise footprint, 45 dBA and higher predicted noise levels.

Epsilon Report Figure 6-1 is also shown for reference.

Some 7041 acres, or 11 square miles, were predicted to be exposed to "mean" noise levels of 45 dBA or higher. Much of that land is leased to the project by participating landowners.

Within the 11-square-mile 45-dBA noise footprint, some 23 non-participating residential properties *with occupied dwellings* (as included on Epsilon Figure 6-1) were found with predicted "mean" levels over 45 dBA at or within the property line. Of those, some 12 dwellings were found with 45-dBA predicted levels at the dwelling itself.

As seen in this letter's Section 3.2, Epsilon Report data substantiate Golden West facility operating noise levels are equal to or higher than predicted.

The Epsilon Report did not assess their measured data to State Statute regulatory limits.

The Epsilon Report data provide *prima facie evidence* that the Golden West Facility wind turbine noise is of sufficient level to constitute *a public nuisance* under State law.

3.4 Epsilon Report Section 4.5 "Evaluation Criteria": evaluates only for A-weighted sound level, omits assessment of *noise disturbance* as regulated under Ordinance No. 02-1 Section 4(a).1.

The Epsilon Report states that "Based on the permit conditions and county noise ordinance, the Golden West Wind Energy Center will be evaluated with respect to the 50 dBA noise limit." The Report provides an incomplete construction of the regulatory obligations of the Golden West facility or any noise source regulated under Ordinance 02-1.

The El Paso County Ordinance regulates with A-weighted sound levels for Sections 4(a)(2) and 4(a)(3). The Epsilon Report appears to consider A-weighting the only regulatory requirement under County law.

However Ordinance 02-1 Section 6 clearly applies only to Section 4(a)(2) and 4(a)(3) and exempts requirement on Section 4(a)(1) for an A-weighting analysis.

> SECTION 6. Classification and Measurement of Noise: For the purposes of measuring any noise to determine whether a person has violated Section 4(a)(2) or 4(a)(3) of this Ordinance, the following test measurements and requirements shall be applied:
>
> a. Any noise originating within a public right of way or other public land shall be measured at a distance of at least 25 feet from the noise source.
>
> b. Any noise originating on private property shall be measured at or within the boundary of the property from which a noise complaint is made.
>
> c. The noise shall be measured on a weighing scale on a sound level meter of standard design and quality and in accordance with the standards promulgated with the American National Standards Institute.
>
> d. For the purposes of this Ordinance, measurements with sound level meters shall be made when a wind velocity at the time and place of such measurement is not more than five (5) miles per hour, or more than twenty-five (25) miles per hour with a windscreen appropriately attached to the microphone.
>
> e. Vehicle noise shall be measured at a distance of at least twenty-five (25) feet from the near side of the nearest lane being monitored and at a height of at least four (4) feet above the immediate surrounding surface.

El Paso County Ordinance 02-1 contains the regulatory prohibition for noise disturbance 4(a)(1) which was omitted from discussion or use in the Epsilon report:

SECTION 4. Prohibited Activities.

(a.) It shall be unlawful to engage in any of the following activities, whether by use of a sound producing device, other device, or other means (either natural or artificial):

1. To knowingly permit, make, cause to be made or continue any noise disturbance, as defined in Section 3(e) of this Ordinance.

3

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2. To exceed the sound levels provided for in Section (5) and as measured as provided for in Section (6), below.
3. To operate a motor vehicle in a public right of way and exceed the sound level provided for in Section (5) and as measured as provided for in Section (6), below.
4. Knowingly and repeatedly sounding any horn or other auditory signaling device on or in any motor vehicle on any public right-of-way or public space, except as a warning of either danger or emergency.

Ordinance Section 3(e) defines "Noise Disturbance":

(e) "Noise Disturbance" means any sound which is:

(1) Harmful or injurious to the health, safety or welfare of any individual; or

(2) Of such a volume, frequency and/or intensity that it unreasonably interferes with the quiet enjoyment of life of an individual of ordinary sensitivity and habits; or

(3) Unreasonably interferes with the value of real property or any business conducted thereon.

Ordinance Section 3(k) defines "sound" as follows:

(k) "Sound" means an oscillation in pressure, stress, particle displacement, particle velocity or other physical parameter, in a medium with internal forces. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

As shown above, the County Ordinance 02-1 Section 4(a)(1) and its supporting definitions clearly prohibit noise disturbance and authorize assessment of noise disturbance by descriptions of sound that "*may include any characteristic of such sound, including duration, intensity and frequency*".

For example: in assessing for noise impacts for compliance with Ordinance Section 4(a)(1), characteristics (and associated criteria) such as,

- one-third octave band noise levels (frequency tonal analysis per ANSI S12.9 Annex C),
- interior low-frequency "Lpa,lf" sound levels (defined by Danish indistrial noise standards for assessing noise impacts from industrial noise sources for preventing noise disturbance),
- acoustic oscillations at the blade pass frequencies of the wind turbines (presence of and intensity in Pascals or Pascals expressed as dB re 20uPA in the range of 0.1 to 1 Hz, re ISO 9996 motion sickness periodic oscillations frequency range), and
- Lmax, dBA noise levels indoors (re WHO 2009 Lmax sleep disturbance thresholds),

are all examples of "descriptions of sound" included by the definition of "sound" underpinning 4(a)(1) and example noise impact criteria.

> *The Epsilon Report states that the survey protocol was coordinated with the County and the facility owner. It is assumed that all parties were fully informed of the noise disturbance complaints, and would have coordinated survey methods and reporting as needed through 4(a)(1) to detail such descriptions of sound to determine and document the noise impacts in the Report.*

Unfortunately the Epsilon Report lacks analysis and assessment of noise complaints and noise disturbance as defined and prohibited in County Ordinance 02-1 Section 4(a)(1).

3.5. Section 6.2 Sound Level Measurement Locations

The Epsilon Report Figure 6-1 shows the turbine and measurement locations.

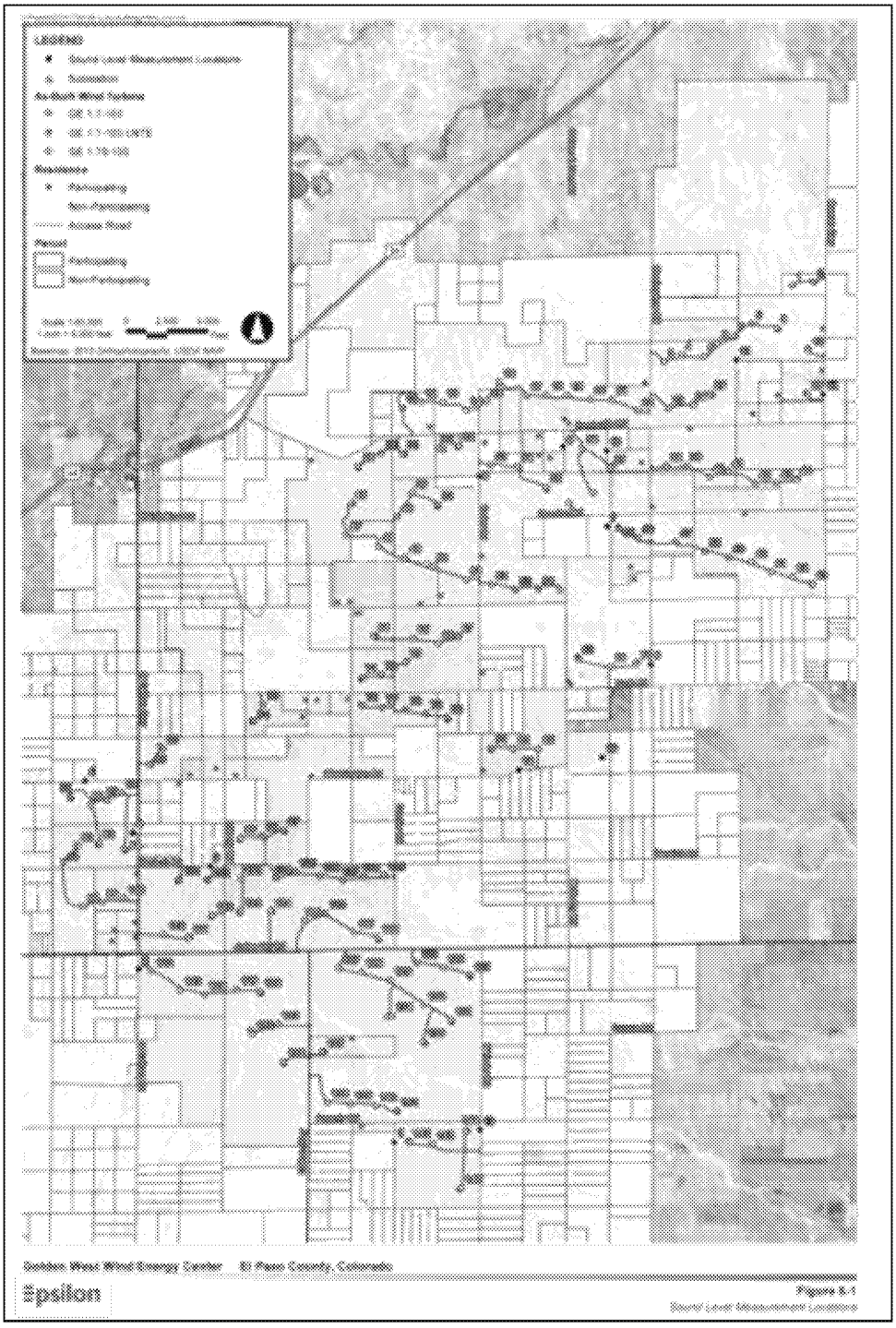


Figure 3.5-1. Epsilon Report Figure 6-1 shown.

The report states the measurements locations (noted ML in this letter) were selected "based on the modeled sound levels". Review of the modeled levels and MLs confirm most MLs were located at a predicted sound level of 48 dBA. See screen shots of predicted noise levels and MLs below. For this section, noise predictions were scaled into Google Earth, overlaid by the Figure 6-1, and notated at the 50, 45, and 40 dBA contours as shown.

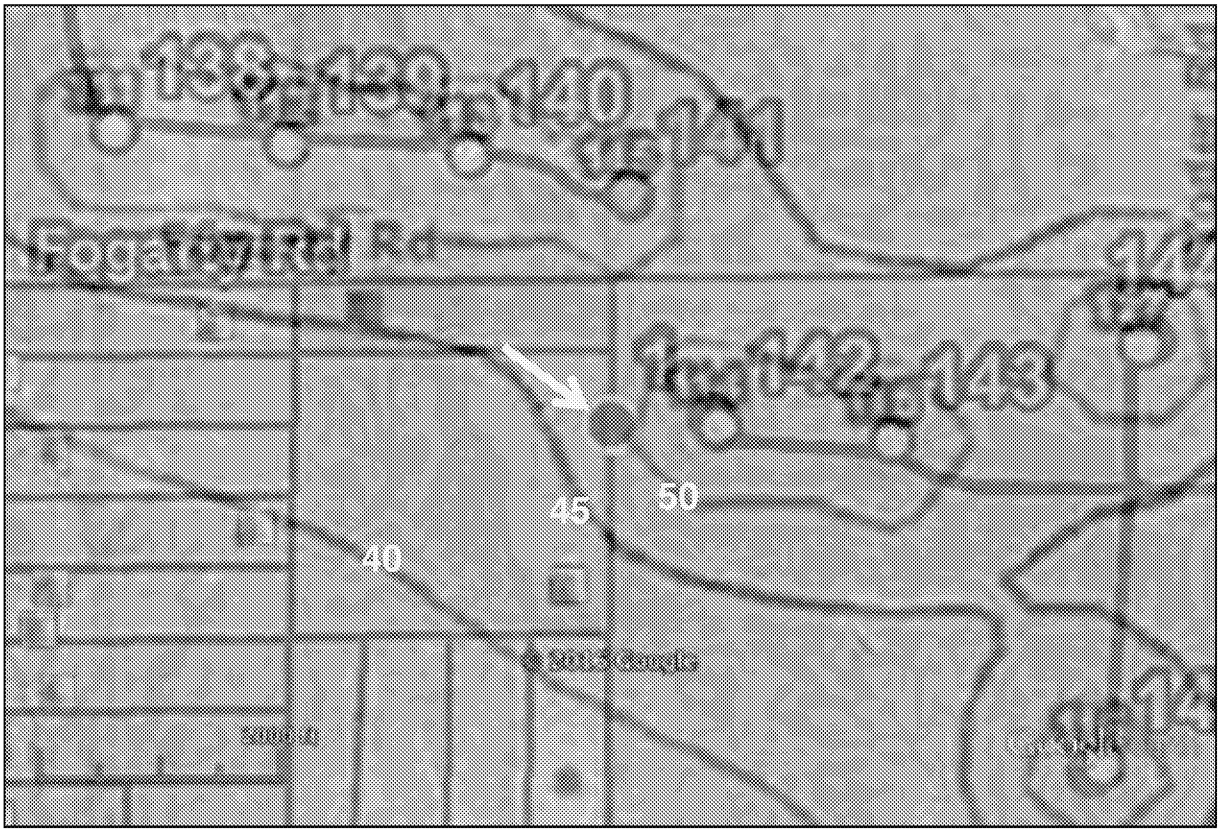


Figure 3.5-1. ML-1 (black dot), located at a predicted sound level of approximately 48 dBA.

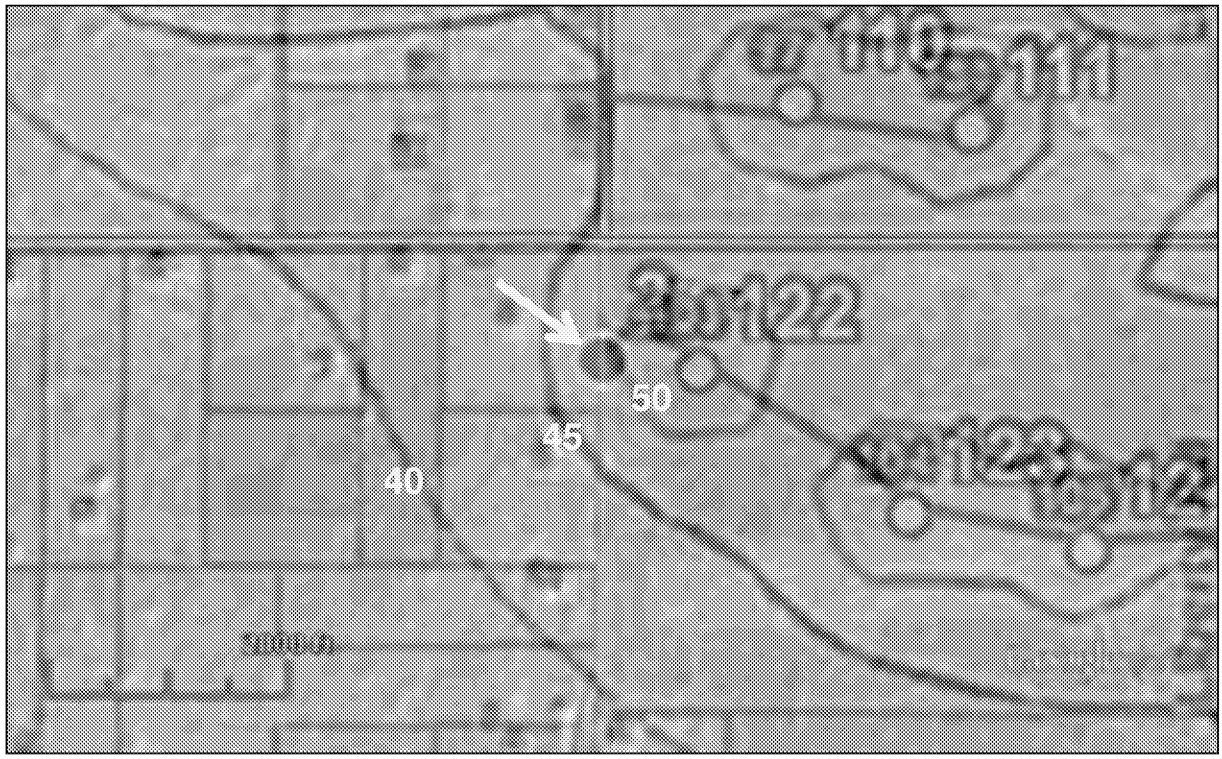


Figure 3.5-2. ML-2 (black dot), located at a predicted sound level of approximately 48 dBA.

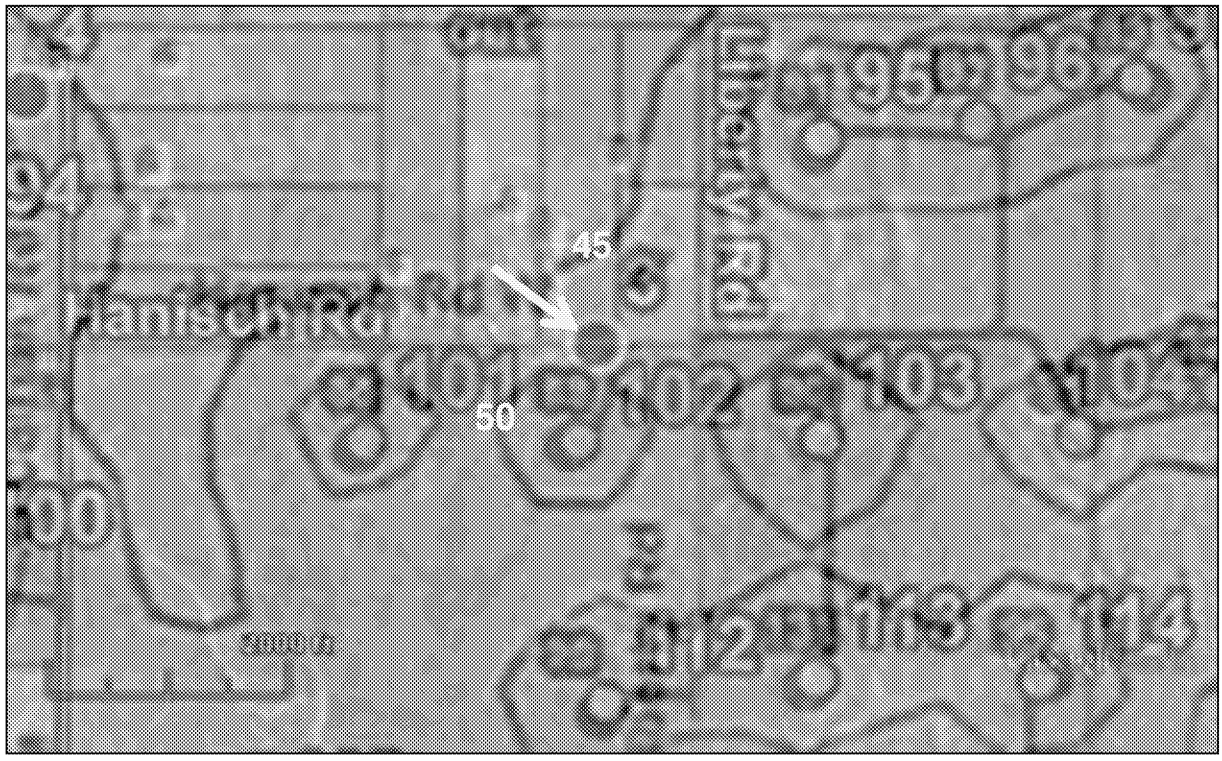


Figure 3.5-3. ML-3 (black dot), located at a predicted sound level of approximately 48 dBA.

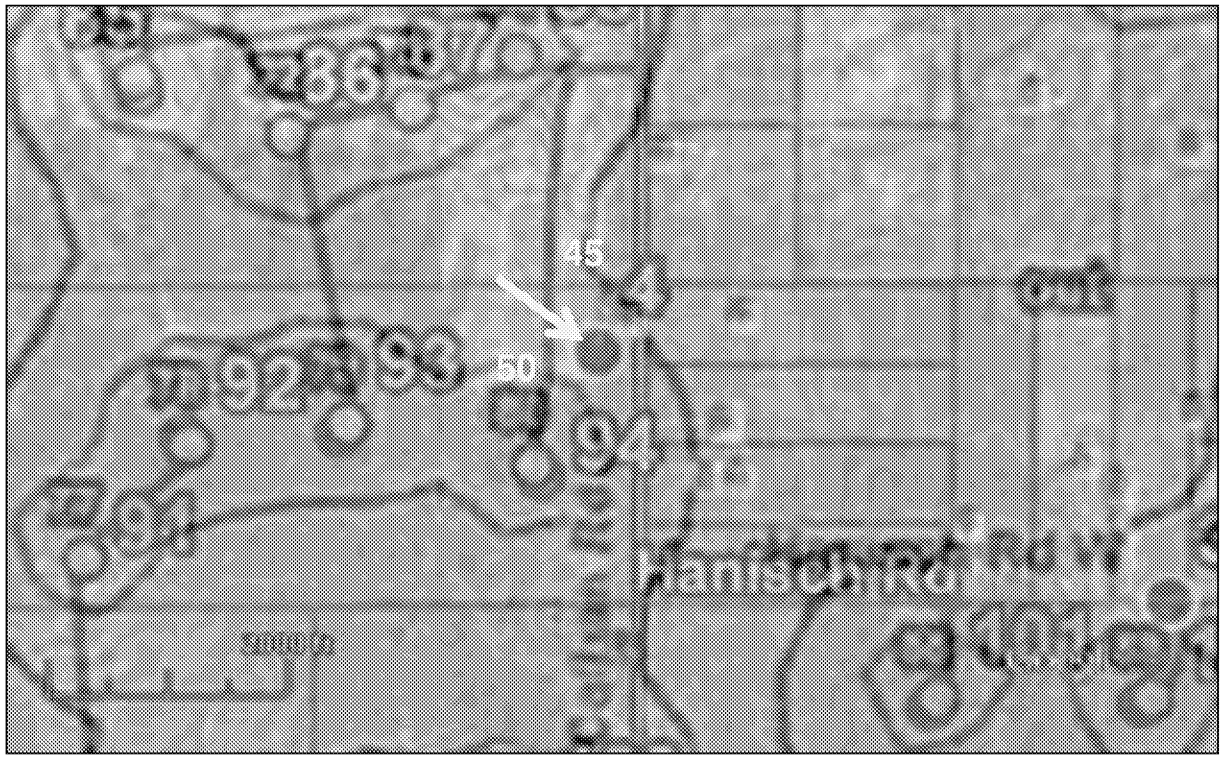


Figure 3.5-4. ML-4 (black dot), located at a predicted sound level of approximately 48 dBA.

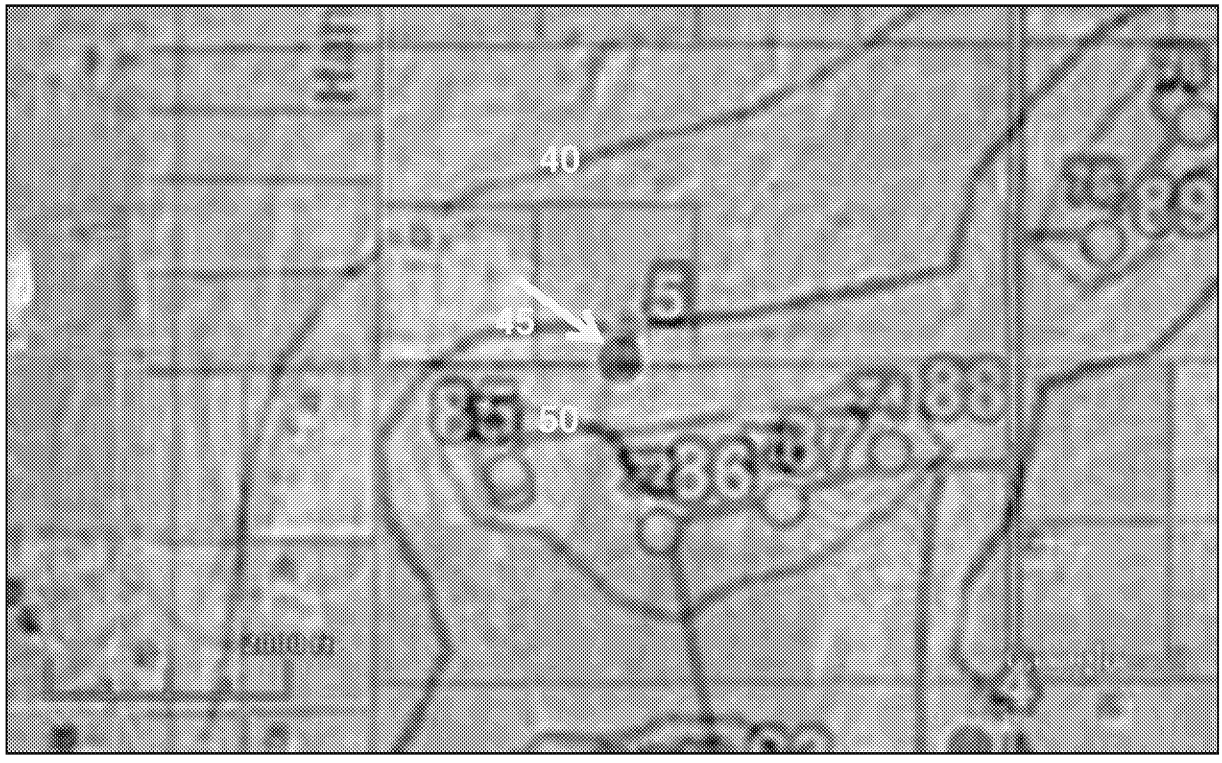


Figure 3.5-5. ML-5 (black dot), located at a predicted sound level of approximately 46 dBA.

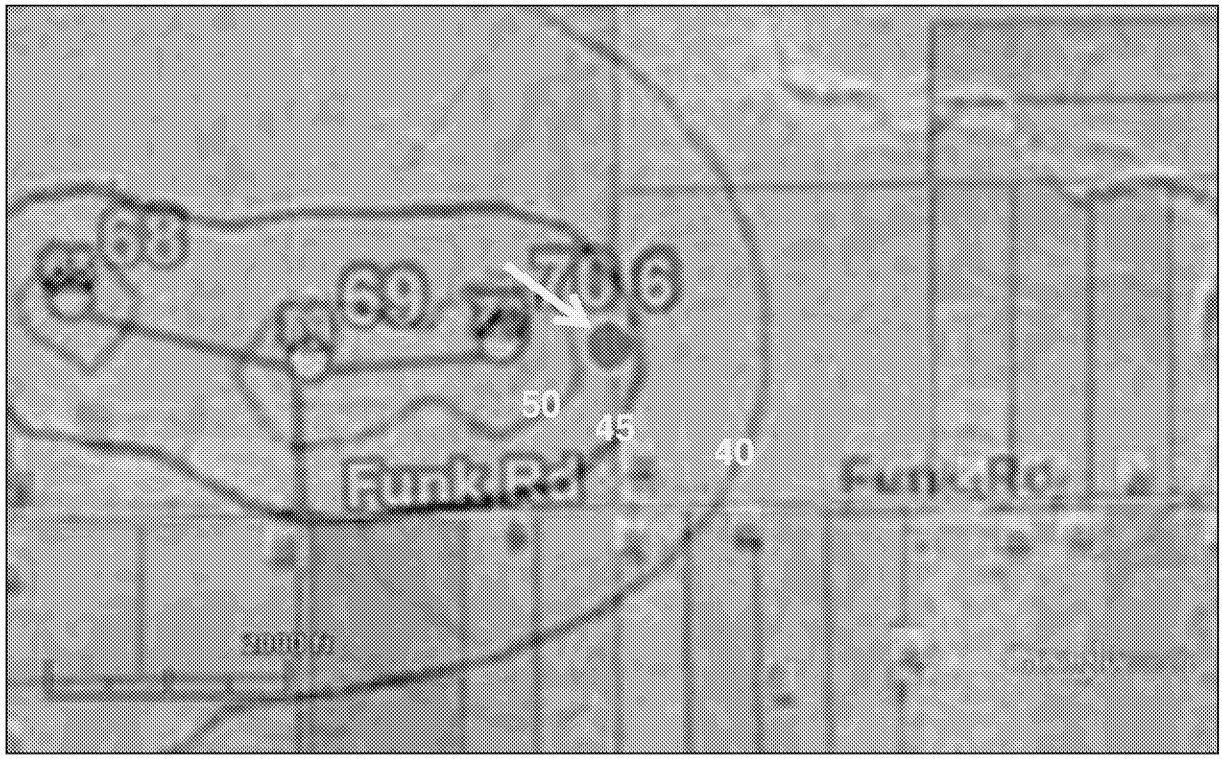


Figure 3.5-6. ML-6 (black dot), located at a predicted sound level of approximately 47 dBA.

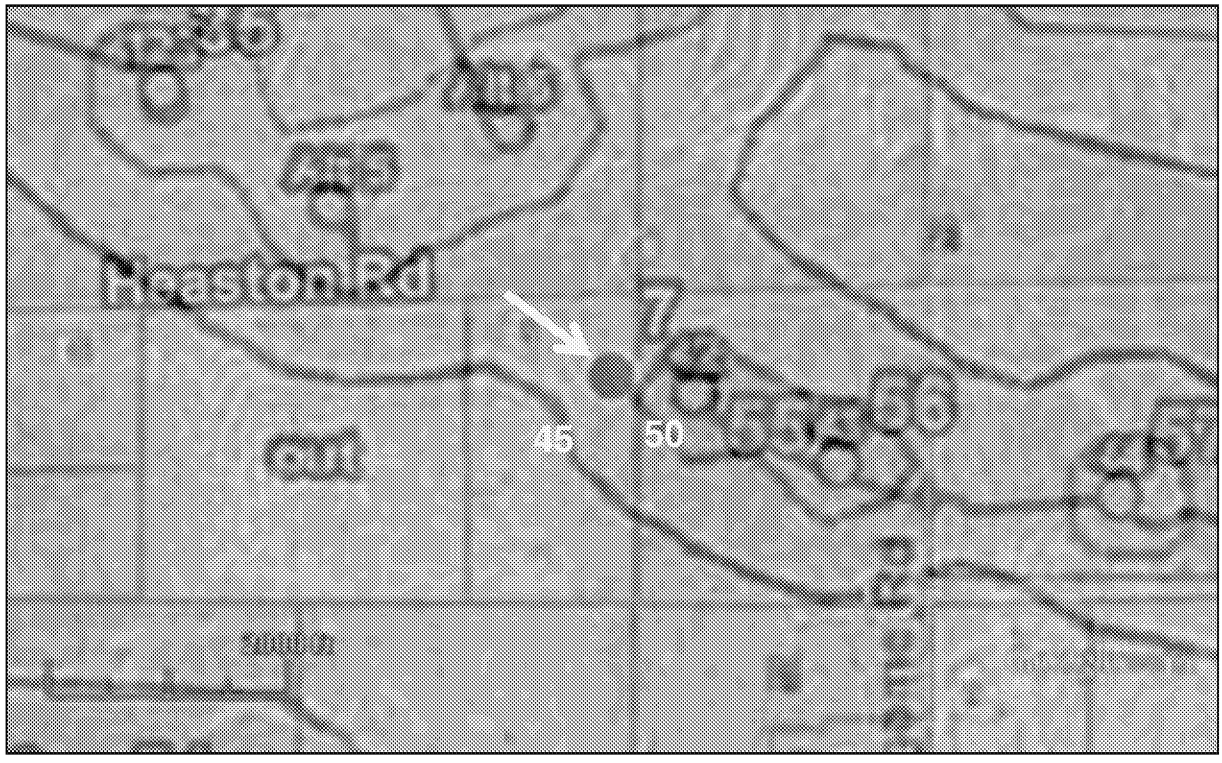


Figure 3.5-7. ML-7 (black dot), located at a predicted sound level of approximately 48 dBA.

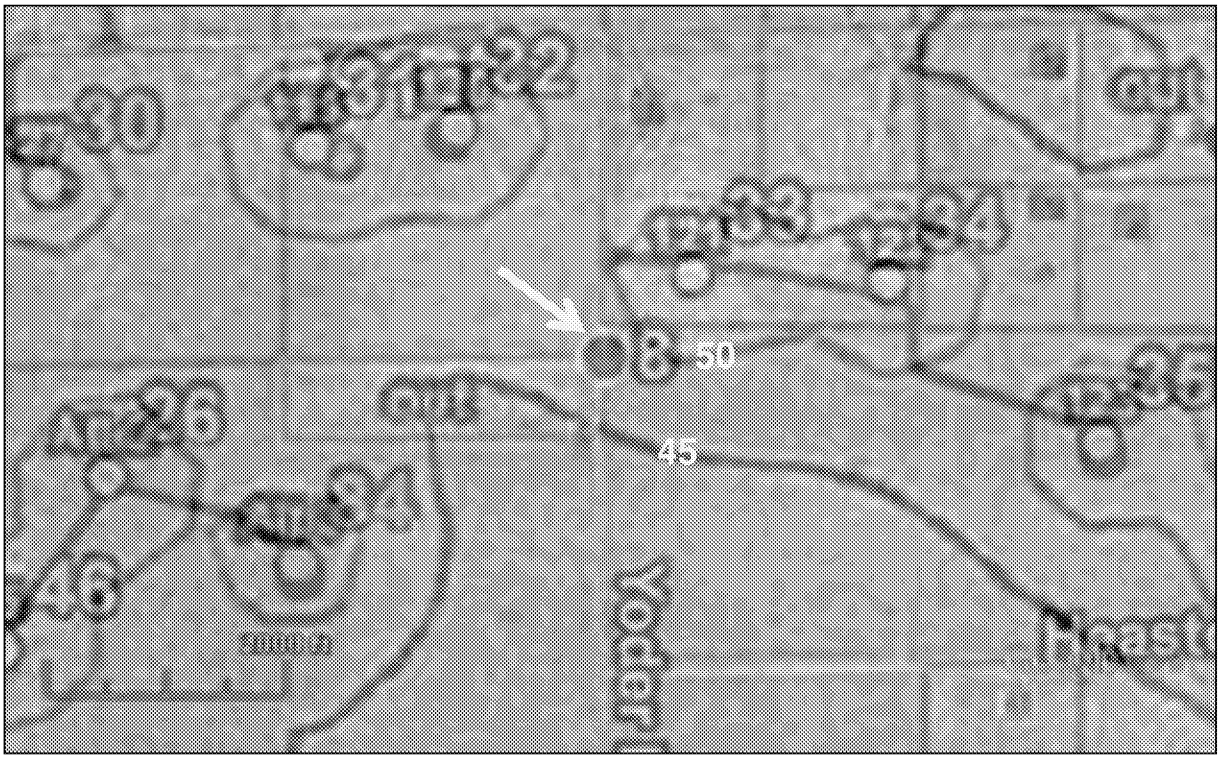


Figure 3.5-8. ML-8 (black dot), located at a predicted sound level of approximately 48 dBA.

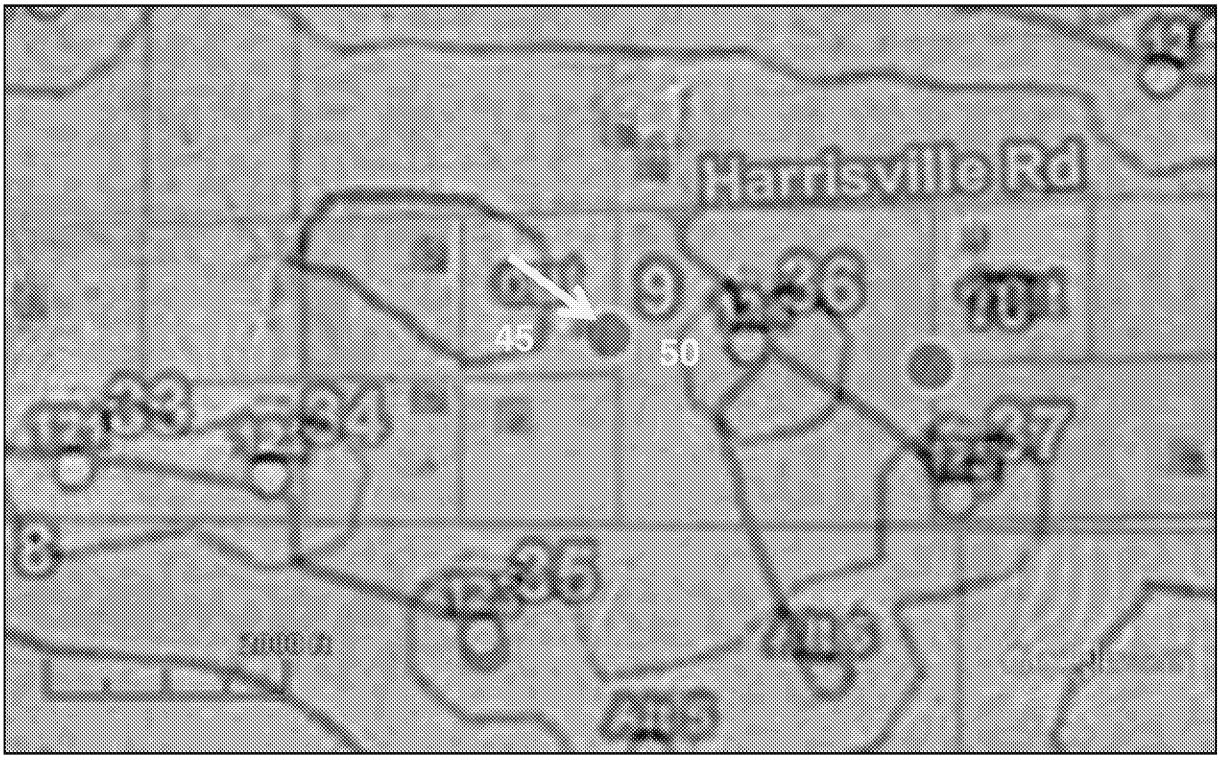


Figure 3.5-9. ML-9 (black dot), located at a predicted sound level of approximately 47 dBA.

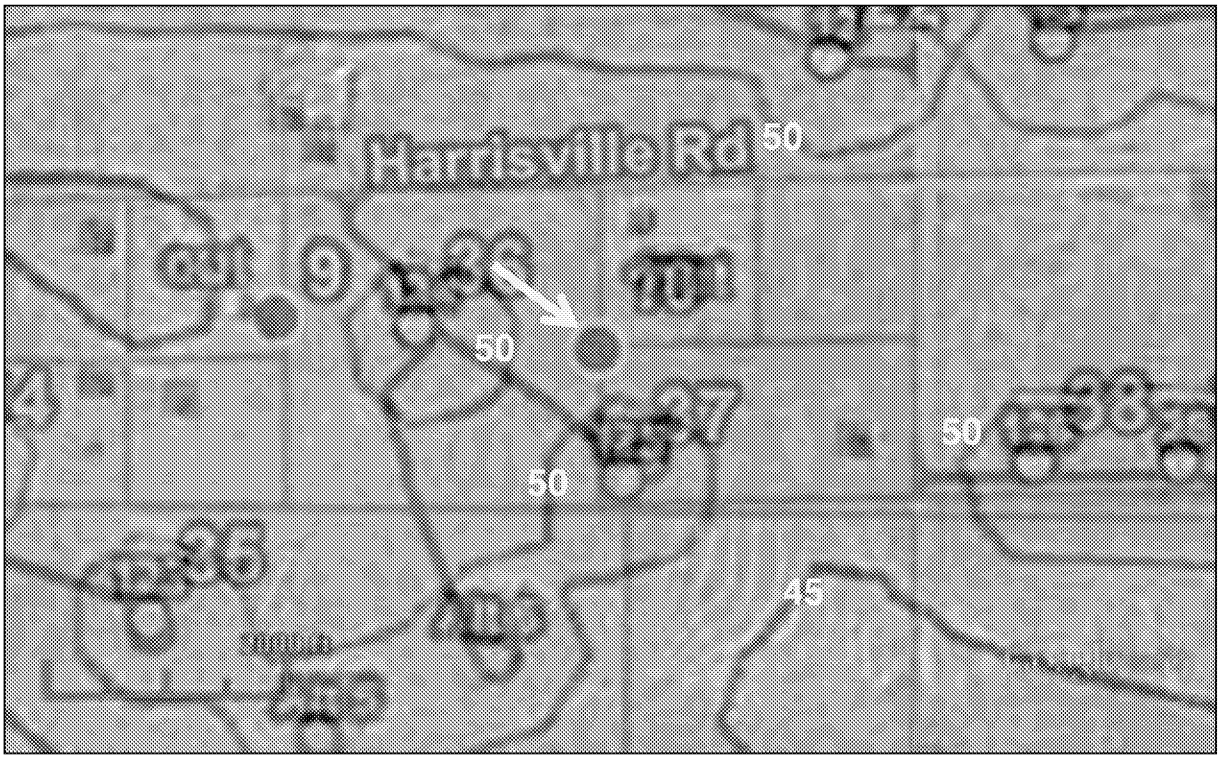


Figure 3.5-10. ML-10 (black dot), located at a predicted sound level of approximately 49 dBA.

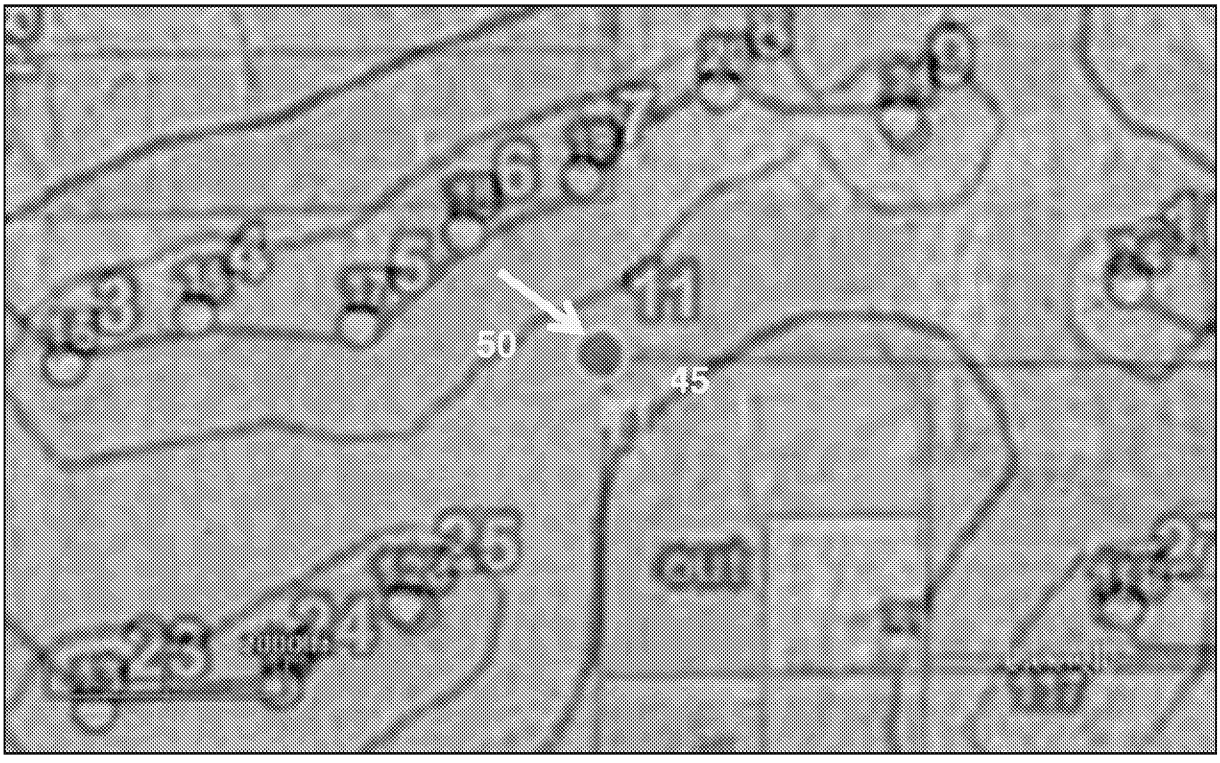


Figure 3.5-11. ML-11 (black dot), located at a predicted sound level of approximately 48 dBA.

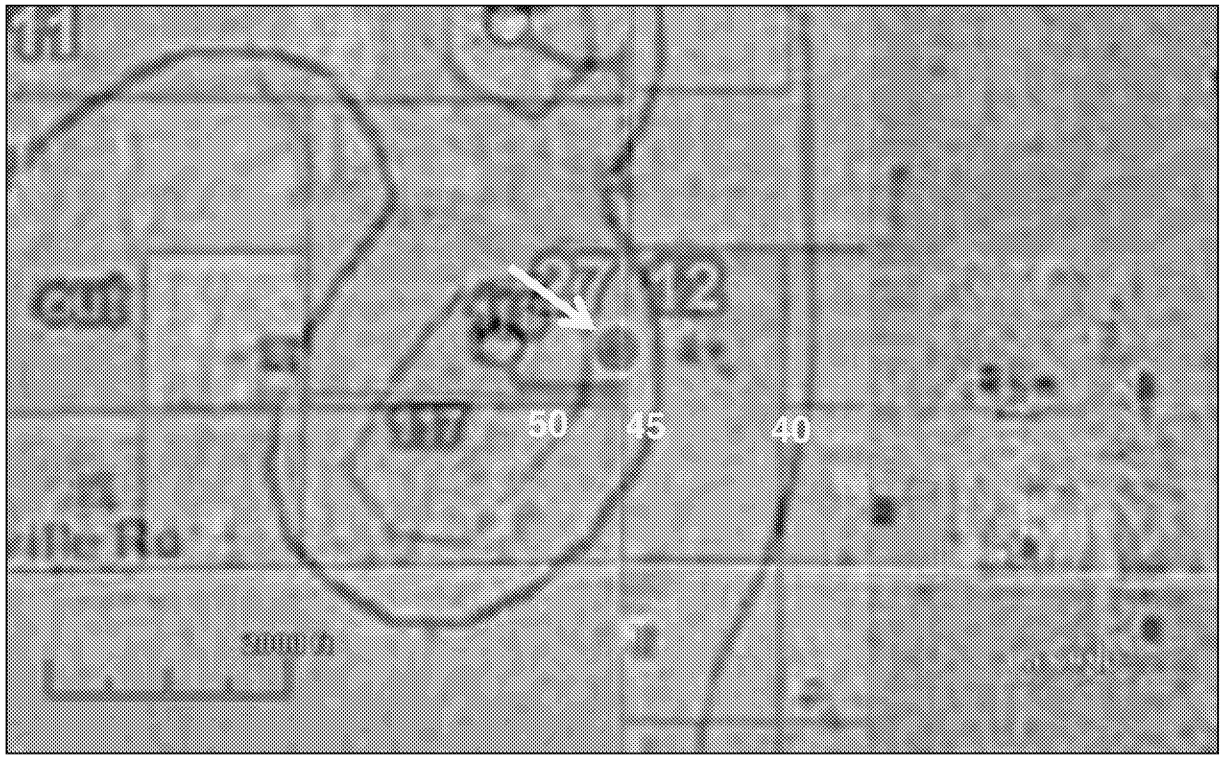


Figure 3.5-12. ML-12 (black dot), located at a predicted sound level of approximately 48 dBA.

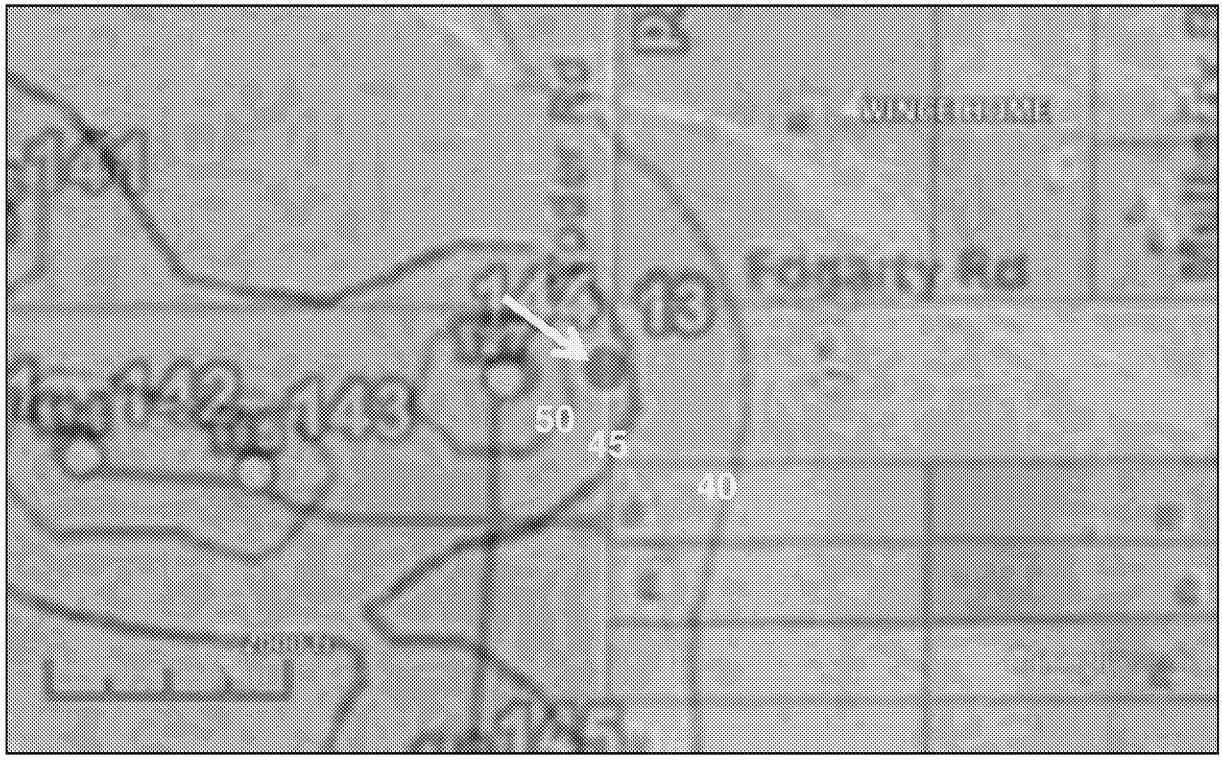


Figure 3.5-13. ML-13 (black dot), located at a predicted sound level of approximately 47 dBA.

Figure 3.5-14. ML-14 (black dot), located at a predicted sound level of approximately 45 dBA.

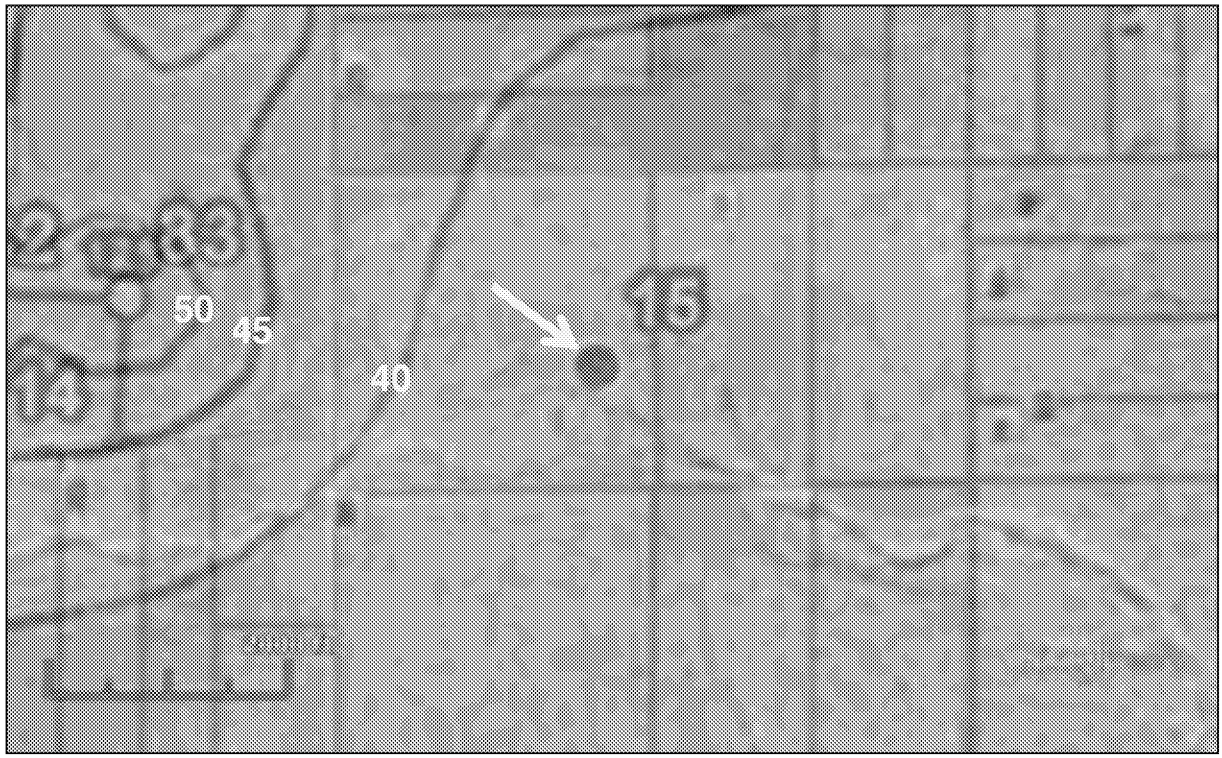


Figure 3.5-15. ML-15 (black dot), located at a predicted sound level of approximately 38 dBA.

3.6. The Epsilon Report shows Location 7 was not at the property line.

Location 7 appears farther away from the nearest Turbine #55 (710 ft) than the nearest non-participating property line (~480 ft based on scaled Epsilon figure). **The distance to the Location 7 assures noise levels from Turbine #55 are under-represented by 3 dB.**

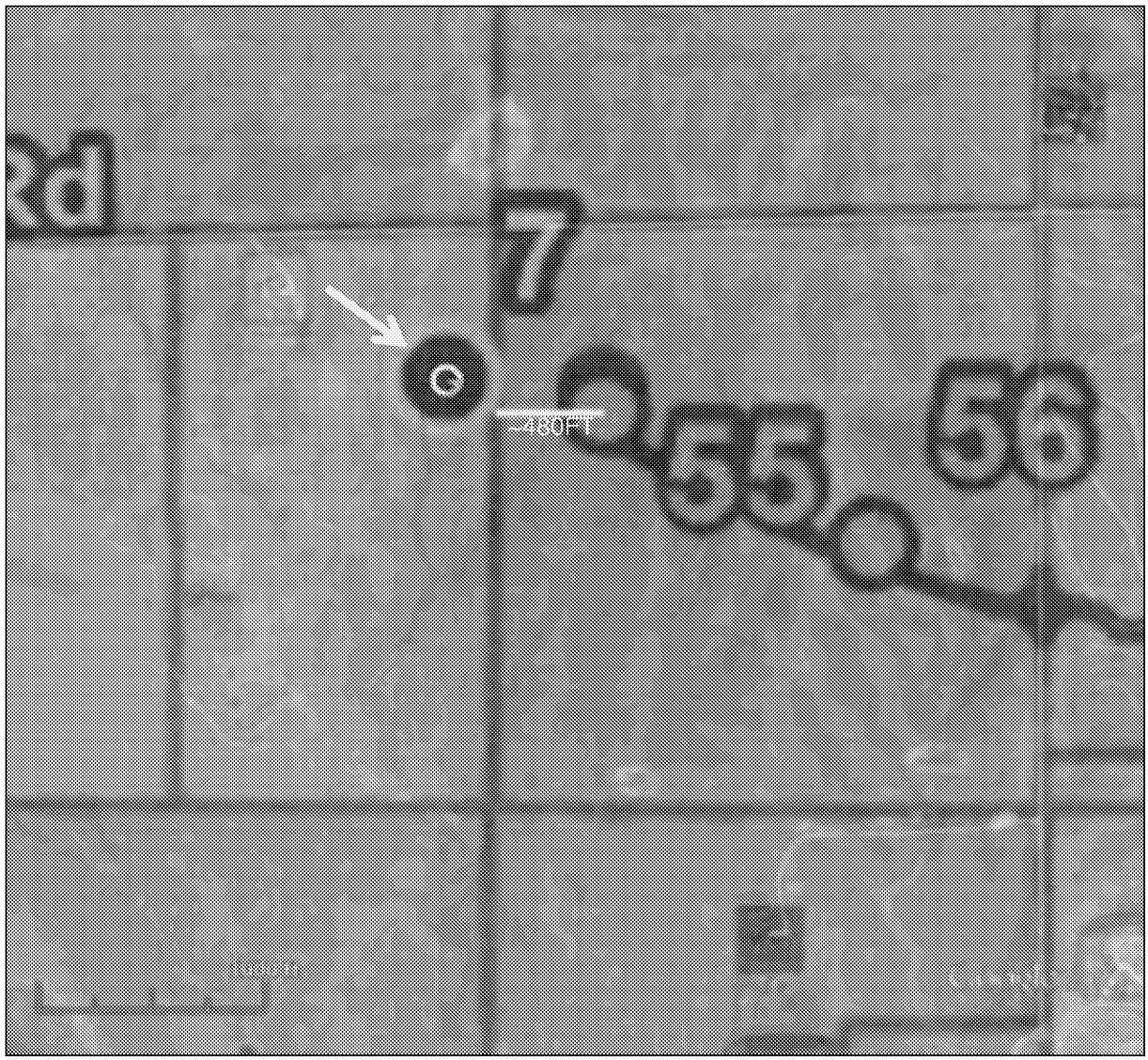


Figure 3.6-1. ML-7, located at 710ft with a predicted sound level of approximately 48 dBA. The sound level at the non-participating property line (~480 ft) would be 3 dB higher.

3.7. The Epsilon Report confirms facility predicted sound levels exceeding 40 dBA over 45 square miles and are higher than predicted

Figure 3.7-1 shows facility predicted 40 dBA and higher noise footprint (red).

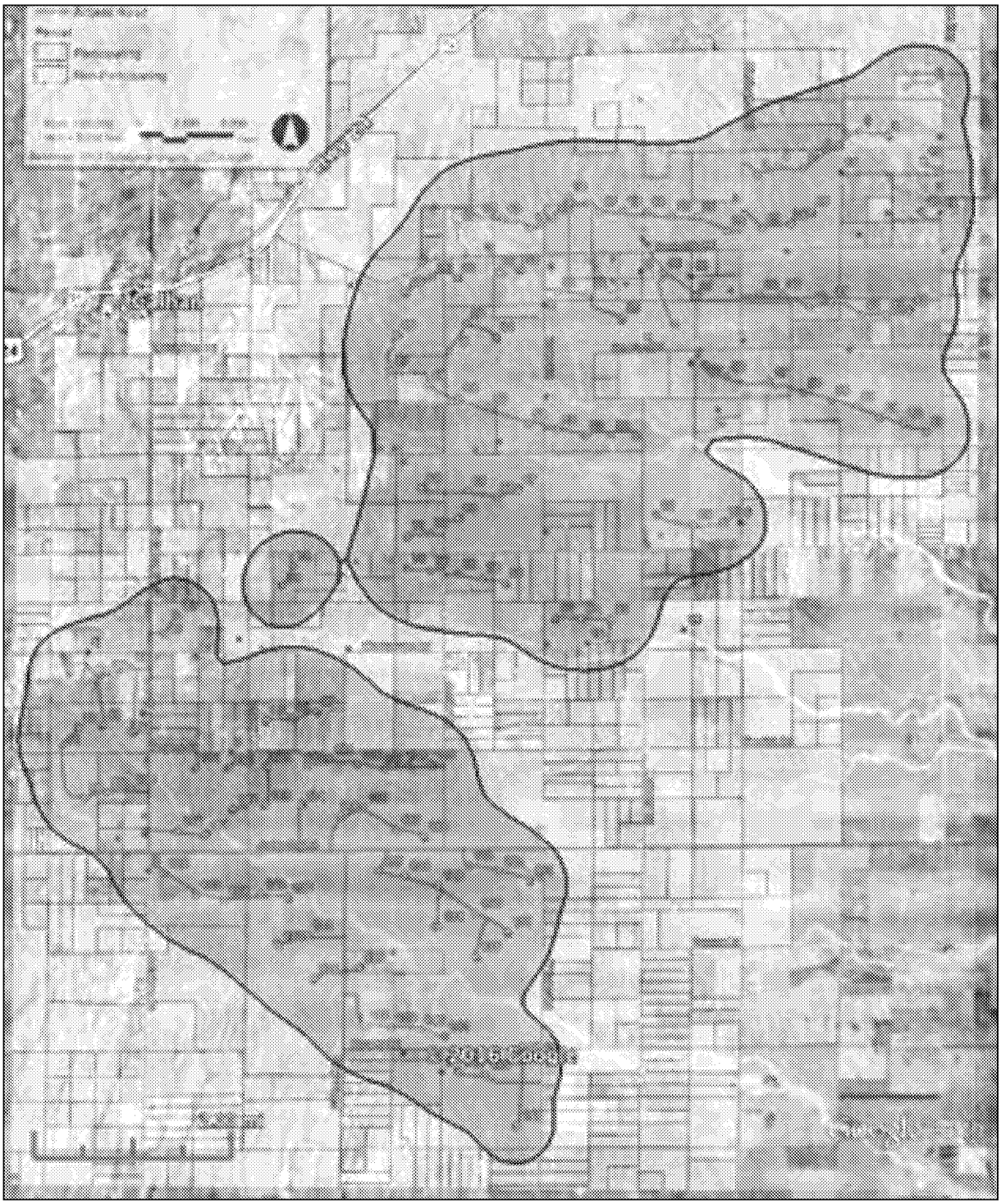


Figure 3.7-1. Golden West facility noise footprint, 40 dBA and higher predicted noise levels.

Epsilon Report Figure 6-1 is also shown for reference. Some 28,808 acres, or 45 square miles, were predicted to be exposed to "mean" (average) noise levels of 40 dBA or higher.

Within the 45-square-mile 40 dBA footprint, some 69 non-participating residential dwellings and 39 participating residential dwellings were found on Epsilon Figure 6-1.

Epsilon Report data substantiate Golden West facility operating noise levels are equal to or higher than the predicted noise levels.

NOISE IMPACT ON COUNTY

A look at the El Paso County as a whole shows the extent of the area with noise effects on people based on the predicted noise emissions from the Golden West facility. See Figure 3.7-2 below. A substantial portion of the county land area is assured sleep disturbance (WHO 2009 adverse effects level). Due diligence would ensure this information was assessed.

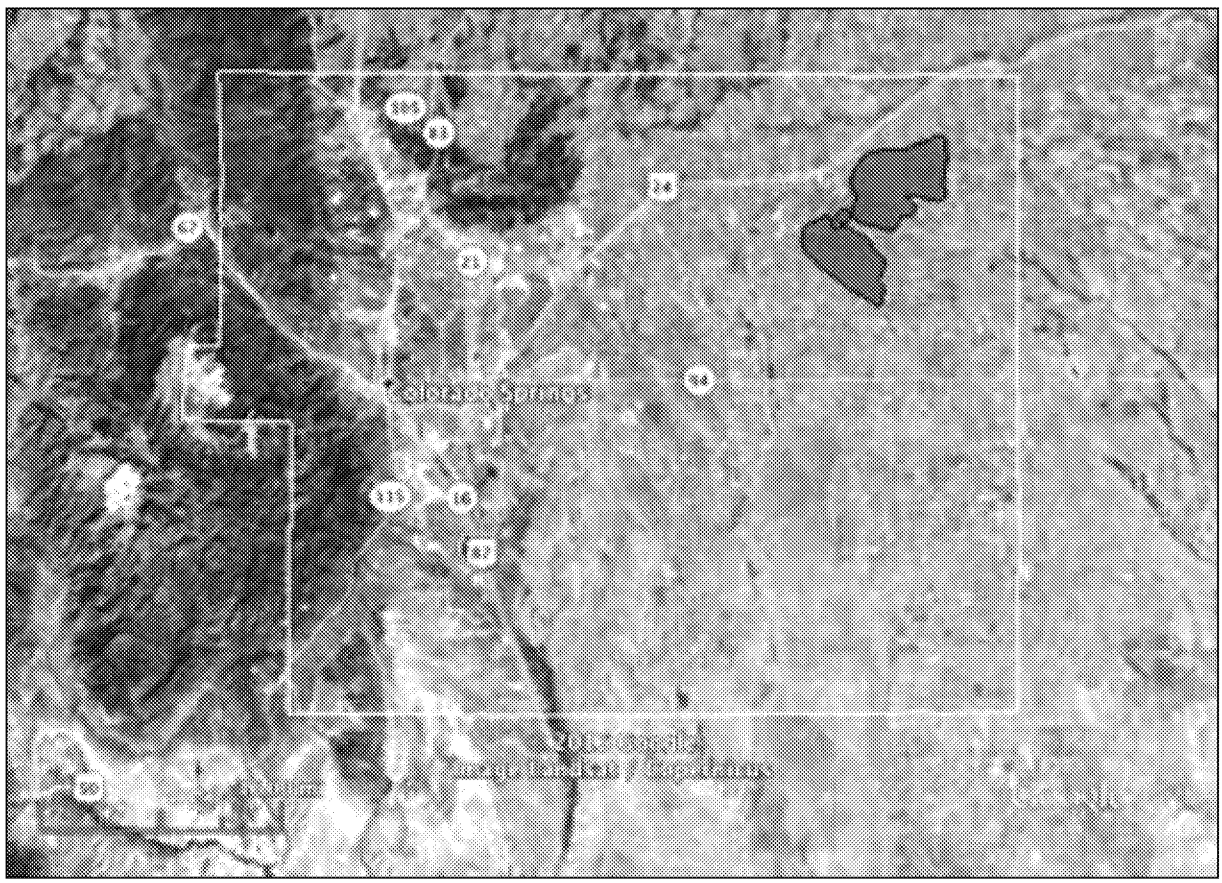


Figure 3.7-2. Noise impact of project for sleep disturbance (levels over 40 dBA, WHO 2009).

3.8. The Epsilon Report did not assess for noise impacts using ANSI standards. ANSI S12.9 Part 5 shows the facility would be INCOMPATIBLE.

If the Epsilon Report had provided such an assessment, the reader would have learned that **the facility noise emissions are *Incompatible with residential land use* especially at night.** Review of the Golden West documents found no assessment for ANSI S12.9 Part 5.

ANSI S12.9 LAND USE COMPATIBILITY RATING

The calculation provided here centers on ANSI S12.9 Part 5 which determines land use compatibility. The calculation of land use compatibility is supported by ANSI S12.9 Part 4. These ANSI standards are adapted from and similar to the US EPA protective guidelines issued under the 1972 Noise Control Act (which is still in effect).

Land use compatibility is defined in ANSI S12.9 Part 5:

> ***3.1 compatible land use**. Land use consistent with the outdoor noise environment such that the annual average of the total day-night adjusted sound exposure or the annual average of the adjusted day-night average sound level at a site is not greater than the compatibility limit designated for that land use.*
> ***3.2 land use**. Existing or intended use of a specifically delineated land area or parcel.*
> ***3.3 land use category**. A logical grouping of a set of related land uses.*

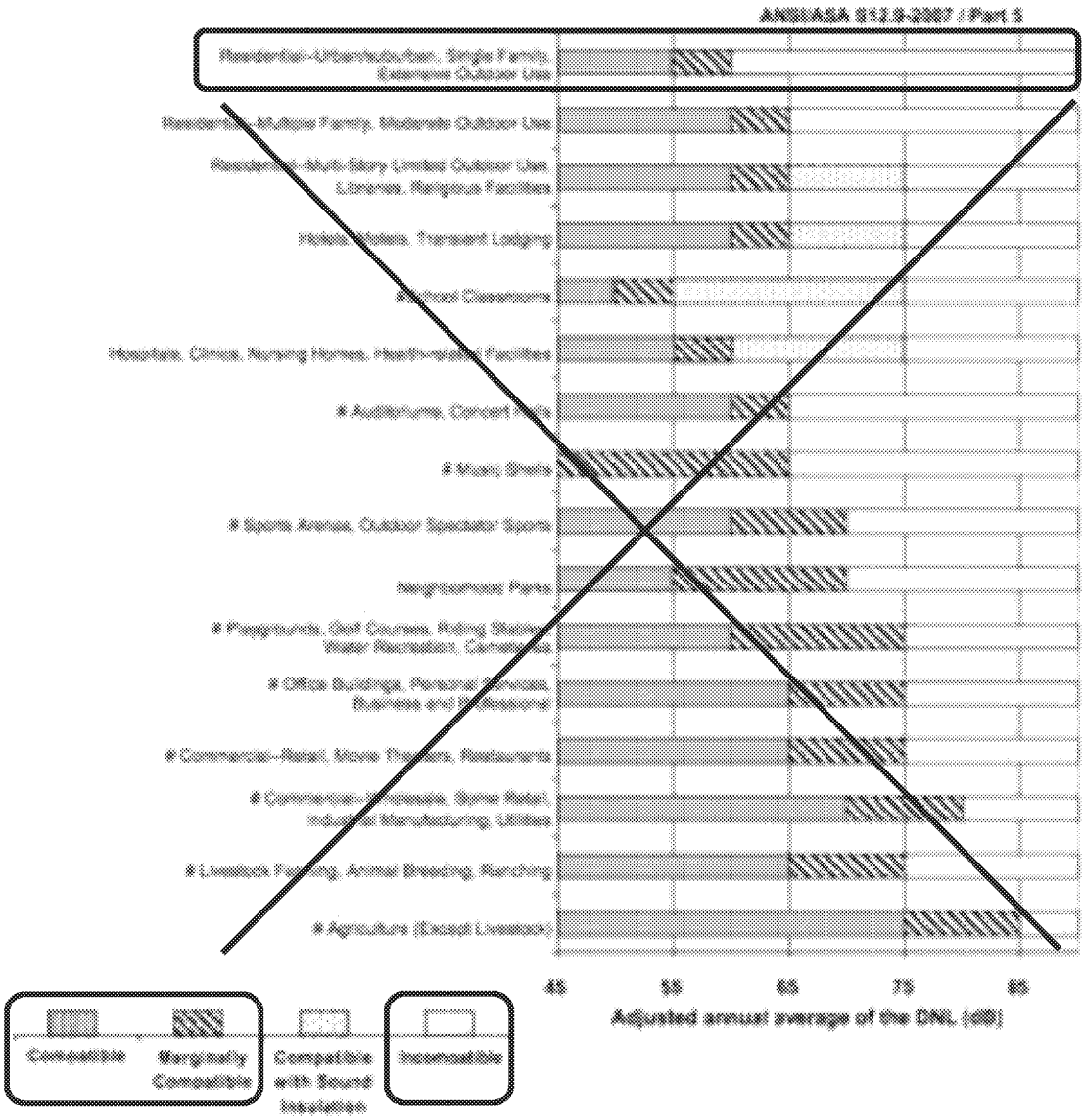
Part 5 Annex A states that "*compatibility of a land use with the outdoor noise environment is assessed by comparing the predicted or measured annual average of the total day-night adjusted sound exposure or the annual average of the adjusted day-night average sound level at a site with the guidance criteria given in Figure A.1.*"

Part 5 Annex A Figure A.1 lists a range of land uses, including at the top, "*Residential-Urban/suburban, Single Family, Extensive Outdoor Use*". This category was selected for evaluation of compatibility for residential land use near the wind turbine facility.

It can be seen that for each land use category a range of acceptable annual average day-night sound levels are listed, for "Compatible", "Marginally Compatible", "Compatible with Sound Insulation", and "Incompatible". For the *Residential-Urban/suburban, Single Family, Extensive Outdoor Use* category, "Compatible" average noise levels (such as those predicted by the Applicant) range up to 55 Ldn, and "Marginally Compatible" ranges between 55 and

60 Ldn. Intrusive noise levels above 60 Ldn are "Incompatible". However an adjustment is then made to account for differences between Residential-Urban/Suburban and Quiet Rural.

ANSI S12.9 Part 5 Annex A Table 1. Red notations indicate which sections are relevant for residential use (circles) and which sections are not relevant (crosses).



Part 5 Annex A Figure A.1 includes a footnote, "*For residences in quiet rural areas (e.g., not near busy roads, busy railroads, grain elevators, etc.), the +10 dB adjustment in ANSI S12.9 Part 4 clause F.3.4.2 should be used.*" Based on knowledge of the area around the Golden West facility, this note was factored into this analysis.

The ANSI S12.9 Part 4 adjustment from urban to the Golden West area quiet rural conditions is a reduction of 15 dBA: 10 dB for "quiet rural settings" (*ANSI S12.9 Part 4 Section F.3.4.2*) and 5 dB for unfamiliar intrusive noise (*ANSI S12.9 Part 4 Section F.3.4.1*). These two factors are additive (*ANSI S12.9 Part 4 Section F.3.4.3*). In practice, these factors may be used to either 1) adjust measured or predicted levels upward to Ldn to assess against ANSI land use compatibility ratings, or 2) adjust ANSI land use compatibility ratings downward to Leq to assess measured or predicted sound levels. For this calculation, the compatibility noise ratings were adjusted downward to Leq *for direct comparison to facility noise levels*.

The tables below summarize the arithmetic utilized to determine land use compatibility noise criteria for the facility noise levels using ANSI S12.9 Parts 4 and 5. "Criteria" means the level that should not be exceeded- the highest allowable long-term average noise level.

Criteria for "Compatibility" per ANSI S12.9:

Factor	**Day-Night Sound Level (DNL)**	***Day Sound Level:***	***Night Sound Level:***	***Average Level (Leq*):***
Part 5 Figure A.1 Residential Urban/suburban, Single Family Marginal Compatibility:	55	*55*	*45*	*49*
Adjust: 10 dB for quiet rural settings (Part 4 F.3.4.1):	-10	*-10*	*-10*	*-10*
Adjust: 5 dB for unfamiliar intrusive noise (Part 4 F.3.4.3):	-5	*-5*	*-5*	*-5*
Criteria for "Compatibility", dBA:	**40**	***40***	***30***	***34***

Criteria for "Marginal Compatibility" per ANSI S12.9:

Factor	**Day-Night Sound Level (DNL)**	***Day Sound Level:***	***Night Sound Level:***	***Average Level (Leq*):***
Part 5 Figure A.1 Residential Urban/suburban, Single Family Marginal Compatibility:	60	*60*	*50*	*54*
Adjust: 10 dB for quiet rural settings (Part 4 F.3.4.1):	-10	*-10*	*-10*	*-10*
Adjust: 5 dB for unfamiliar intrusive noise (Part 4 F.3.4.3):	-5	*-5*	*-5*	*-5*
Criteria for "Marginal Compatibility", dBA:	**45**	***45***	***35***	***39***

* The energy-equivalent average level (Leq) equivalent to a day-night level (DNL) is 6 dB less than the day-night level due to level weighting of -10 dB from 10 pm to 7 am.

The highest long-term average wind turbine noise level that could be considered "Compatible" under ANSI S12.9 Parts 4 and 5 at occupied dwellings near the wind turbine facility is DNL 40, which equates to Leq 40 dBA,day, Leq 30 dBA,night, equivalent to a long term average of 34 dBA,Leq if the noise source was constant in its noise output.

Wind turbine average noise levels above 40 dBA,night would be *Incompatible* under ANSI standards.

Epsilon would have had intimate knowledge of and access to the ANSI S12.9 Part 5 noise impact assessment during Report development [3]. There is no explanation in the Report for omitting the ANSI assessment.

> *The Golden West facility noise exposure data was submitted to the County by the applicant during the permitting process. It must be presumed that the County is well acquainted with ANSI standards and would have utilized ANSI S12.9 in their due diligence work to assess whether the facility would or would not be compatible with the quiet rural residential land use according to ANSI standards.*

3.9. The Epsilon Report did not assess for noise impacts using known noise impact guidelines as criteria for sleep disturbance from the WHO.

It is more than troubling that Epsilon, *having cited WHO 2009 sufficient evidence as cautionary limits in a previous non-wind-turbine project* [4], chose to ignore the Golden West wind turbine facility permit requirement to assess for noise impacts and omit assessment noise impacts relative to WHO 2009 for the Report.

From the World Health Organization 2009 Executive Summary [16],

> *The review of available evidence leads to the following conclusions.*
> *• Sleep is a biological necessity and disturbed sleep is associated with a number of adverse impacts on health.*
> *• There is sufficient evidence for biological effects of noise during sleep: increase in heart rate, arousals, sleep stage changes and awakening.*
> *• There is sufficient evidence that night noise exposure causes self-reported sleep disturbance, increase in medicine use, increase in body movements and (environmental) insomnia.*
> *• While noise-induced sleep disturbance is viewed as a health problem in itself (environmental insomnia), it also leads to further consequences for health and well-being.*
> *• There is limited evidence that disturbed sleep causes fatigue, accidents and reduced performance.*
> *• There is limited evidence that noise at night causes hormone level changes and clinical conditions such as cardiovascular illness, depression and other mental illness. It should be stressed that a plausible biological model is available with sufficient evidence for the elements of the causal chain.*

Emphasis:

> *"**noise-induced sleep disturbance is viewed as a health problem in itself**".*
> *"**a plausible biological model is available with sufficient evidence for the elements of the causal chain**"*

The WHO further states,

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16 WHO Night Noise Guidelines (NNGL) For Europe, 2009. ISBN 978 92 890 4173 7.

"...adverse health effects are observed at the level above 40 dB Lnight,outside, such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs and sedatives."

The WHO 2009 Night Noise Guidelines Summary is shown below.

Average night noise level over a year $L_{night,outside}$	Health effects observed in the population
Up to 30 dB	Although individual sensitivities and circumstances may differ, it appears that up to this level no substantial biological effects are observed. $L_{night,outside}$ of 30 dB is equivalent to the no observed effect level (NOEL) for night noise.
30 to 40 dB	A number of effects on sleep are observed from this range: body movements, awakening, self-reported sleep disturbance, arousals. The intensity of the effect depends on the nature of the source and the number of events. Vulnerable groups (for example children, the chronically ill and the elderly) are more susceptible. However, even in the worst cases the effects seem modest. $L_{night,outside}$ of 40 dB is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.
40 to 55 dB	Adverse health effects are observed among the exposed population. Many people have to adapt their lives to cope with the noise at night. Vulnerable groups are more severely affected.
Above 55 dB	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases.

Table 3
Effects of different levels of night noise on the population's health

Table 3.9-1. Effects of different levels of night noise on the population's health, WHO 2009 Executive Summary Table 3.

They include a yearly average sound level of 30 dBA, night, outdoors as the level below, which there are no observed health effects, the "No Observed Effects Level" or NOEL. Above the 30 dBA NOEL, health effects including sleep disturbance were found, mild at lower levels for healthy individuals and more adverse with higher levels for "vulnerable groups"; children, the elderly, and people with disease or pre-existing health conditions. Above 40 dBA, the "No Observed Adverse Effects Level" (NOAEL), adverse health impacts are clearly evident and more severe for vulnerable groups.

WHO's 2009 Table 1 listing of sufficient evidence for effects and threshold levels (see Table 3.9-2 below) includes the medical sufficient evidence that noise impacts produce biological effects on sleep and health, including EEG awakening,

I understand that neighbors including children have been directed by the Board of Health to obtain sleep sedatives in order to combat sleep deprivation due to noise exposure. This is unfortunately consistent with the indicator below of 40-42 dBA "Lnight,outside" which was forecast at numerous neighbor residential properties.

Effect		Indicator	Threshold, dB
Biological effects	Change in cardiovascular activity	*	*
	EEG awakening	$L_{night,outside}$	35
	Motility, onset of motility	$L_{night,outside}$	32
	Changes in duration of various stages of sleep, in sleep structure and fragmentation of sleep	$L_{night,outside}$	35
Sleep quality	Waking up in the night and/or too early in the morning	$L_{night,outside}$	42
	Prolongation of the sleep inception period, difficulty getting to sleep	*	*
	Sleep fragmentation, reduced sleeping time	*	*
Well-being	Increased average motility when sleeping	$L_{night,outside}$	42
	Self-reported sleep disturbance	$L_{night,outside}$	42
	Use of somnifacient drugs and sedatives	$L_{night,outside}$	40
Medical conditions	Environmental insomnia**	$L_{night,outside}$	42

Table 1 Summary of effects and threshold levels for effects where *sufficient* evidence is available

* *Although the effect has been shown to occur or a plausible biological pathway could be constructed, indicators or threshold levels could not be determined.*

***Note that "environmental insomnia" is the result of diagnosis by a medical professional while "self-reported sleep disturbance" is essentially the same, but reported in the context of a social survey. Number of questions and exact wording may differ.*

Table 3.9-2. Thresholds for observed noise effects, WHO 2009 Executive Summary Table 1.

The WHO documented that motility, onset of motility, and changes in duration of various stages of sleep, in sleep structure and fragmentation of sleep, occur with a maximum indoors noise level in the range of 32 to 35 dBA. These researched medical health impacts are from **momentary maximum noise levels**, not noise levels averaged over a year.

Recent testing in a quiet rural area in Vermont confirmed that the A-weighted outdoor-to-indoor wind turbine noise level reduction (OILR) can be very poor, on the order of 1-3 dBA [17] with windows open. For example, periodic wind turbine noise (such as "whumps" or "thumps" as often reported by neighbors) of 43 dBA outdoors could result in an indoors sudden intrusive noise of 40-42 dBA, well above the Lmax sleep disturbance thresholds established by WHO medical research. Maximum outdoors intrusive industrial noises above 35-40 dBA while windows are open can result in **sleep disturbance** due to intrusive indoors noise levels above thresholds established by WHO sufficient evidence.

For nights when El Paso County occupied dwellings windows must be open to cool the house and improve sleeping, there could be a condition where intrusive wind turbine noise levels indoors can be almost the same as outdoors wind turbine noise levels. The Epsilon Report documents that the Golden West facility is capable of producing *average* outdoors noise levels above 40 dBA at numerous occupied dwellings.

As shown in Figure 3.7-1, the Golden West facility noise footprint for 40 dBA and higher covers an extensive area with many homes. The total land area affected is 45 square miles. **Total occupied dwelling residences noted on Epsilon Figure 6-1 with predicted noise levels above 40 dBA were counted as 108: 39 participating, 69 non-participating.**

Epsilon omitted assessment of Golden West noise impacts on children, chronically ill and elderly. The WHO identified children, chronically ill, and elderly as vulnerable risk groups. The Epsilon Report as submitted raises a serious matter of professional practice.

> *The Epsilon Report omissions raise another serious matter for the Golden West permit: While regulators tend to dismiss consideration of participating homes who signed lease agreements, some homes may have children, chronically ill and elderly residing. Through the lease and permit process and in exchange for fee payment, did the County and applicant agree to waive protection from noise-induced sleep disturbance impacts on health and welfare for children, chronically ill, and elderly.*

--This concludes supplemental details for this review of the Epsilon Report.

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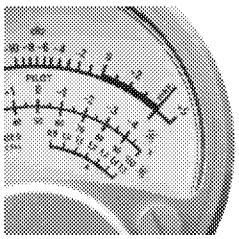
17 "Acentech measurements in July 2014 under similar test conditions did generally agree with this value; and depending on the measurement location within the room, yielded an OILR value of about 1 to 3 dBA with the windows fully open.", Acentech Report to Vermont Public Service Department, Vermont Public Service Board Docket 7156, Acentech Project 624219, 25 September 2015.

4. Reviewer Qualifications

Robert W. Rand, ASA, INCE, is the principal investigator at Rand Acoustics. I am a Member of the Institute of Noise Control Engineers (INCE) since 1993 and a Member of the Acoustical Society of America (ASA). I am a principal acoustic investigator with over thirty-five years of experience including environmental and technical consulting services to power generation, commerce, industry, regulatory agencies, and communities. My several decades of experience surpasses equivalent requirements for Board Certification in INCE, and includes large-scale industrial noise control and cost management, environmental impact assessment, interior acoustics, and electro-acoustics, with ten years working in multiple forms of electric power generation, gas transmission, and process facilities in the Noise Control Group at Stone & Webster Engineering Corporation in Boston, Massachusetts. I have conducted environmental acoustic analyses, project engineering and cost analyses, permitting reviews, acoustic testing, noise control design, and operations monitoring activities for power generation and commercial projects. I have provided an independent acoustic consultancy to industry, commercial, and community clients since 1996. For the last eight years since Spring 2009 I have been investigating wind turbine noise with site noise measurements and analysis. I have furnished reports and expert testimony at a number of hearings, including federal, state and local governments. A copy of my biography, work history, cases where I have been accepted as an expert witness in the field of acoustics, and a list of papers published is available separately.



Preliminary Field Report

Project: Independent Infrasonic Investigations
Location: Vicinity of Golden West Wind Facility, El Paso County, CO

Report Date: 29 January 2016

Investigator: Robert W. Rand, ASA, INCE
Rand Acoustics, Boulder, CO

Contents

1.0 Summary

Differential acoustic pressure measurements were acquired and logged at three homes in the vicinity of the Golden West Wind Facility in El Paso County, Colorado during December 2015 and January 2016. A week of data was analyzed for each of the three homes and daily spectrograms produced which are attached. Each day's data consisted of approximately 4.3 million differential pressure samples with a week comprised of some 30.5 million samples.

Preliminary investigation confirmed the presence of recurring acoustic pressure oscillations at 0.2 to 0.85 Hz (the "blade pass frequency" or BPF) which are associated to the Golden West wind turbine rotations. At times multiple oscillation frequencies were observed, consistent with multiple turbines operating at different rotation rates. Oscillations appeared to be more pronounced when the turbines are more upwind rather than downwind. Neighbors reported they are mostly downwind due to turbine location relative to home location and for the prevailing winds in the region.

Typical BPF total acoustic power were computed for example portions of the differential pressure data sets. Crest factors (the ratio of RMS to peak levels) were also computed for segments dominated by wind turbine rotation and uncontaminated by other noise, with typical crest factors of 13-19 dB. Totalized BPF RMS levels ranged from 56 to 70 dB re 20uPA, with peak levels from 71 to 89 dB. The RMS and peak levels are similar to those found at other sites with appeals to stop the noise, legal action, and homes abandoned.

It is understood from neighbors that they have experienced disturbance since the turbines started operating whereas prior to turbine operation there was no similar disturbance. It is understood that neighbors report improvement when turbines are shut down (not rotating) or when they remove themselves physically away from the Facility a distance of several miles.

El Paso County noise regulations define "Sound" as oscillations in pressure (or other physical parameter) at any frequency, and, prohibits noise disturbance due to acoustic oscillations.

The analysis is far from complete in that numerous segments of each day at each monitoring location could be analyzed and associated to journal entries and/or medical data. The reported association of proximity to the operating facility to disturbance in health and quality of life appears supported by the acoustic data acquired for this preliminary investigation. These preliminary investigations suggest that there is a condition of noise disturbance due to very low frequency acoustic pressure oscillations in the vicinity of the Golden West Wind Facility when it is operating, with more severe impacts downwind.

2.0 Project Description

Investigations of possible infrasonic acoustic oscillations on properties were requested in 2015 by neighbors living in El Paso County in the vicinity of the newly constructed Golden West Wind Facility.

2.1 Methodology

Independent data acquisition for acoustic, sensation, and medical data. This report presents acoustical data primarily, with reference to neighbor journal reports. Medical data are not discussed in this report.

2.2 Acoustic data acquisition

Sensors: Infiltec INFRA-20 solid-state differential pressure sensor as micro barometer, +/-25Pa, 16-bit, serial data output at 9600 baud, 0.000945 Pascals per count, 50 Hz sample rate. High-pass pneumatic filter at 0.05 Hz and high pass digital filter at 0.125 Hz. Analog 8 Pole elliptic filter with 20 Hz corner frequency for anti-aliasing.

Loggers: Rand Acoustics SDL2 Serial Data Logger. Serial data stored hourly to SD card files with time synchronized to GPS.

Calibration: INFRA-20 micro barometers operate as differential (not absolute) pressure sensors with differential sensitivity calibrated at factory. Digital gain in INFRA-20 serial data output fixed at 0.000945 Pascals per count. Total pressure range, +/-25 Pascal.

Setup: Installation by INCE member or through trained instruction by INCE member on installation and operation of infrasonic sensor and data logger system in home. Sensor and logger set up in quiet location in home and run unattended. SD storage card changed at intervals as required.

Analysis: SpectraPlus SE time series, spectrogram and spectrum analysis. Imported INFRA-20 data Digitally resampled to 50 Hz using linear phase bandlimited interpolation algorithm combined with large oversampling, passband 0 to 22 Hz. Typical FFT frame used 8192 samples, Hanning weighting, 81.92 second FFT frame, no averaging, 50 percent overlap.

2.3 Sensation data acquisition

Journals: Journals kept by neighbors to document sensation and conditions.

2.4 Medical data acquisition

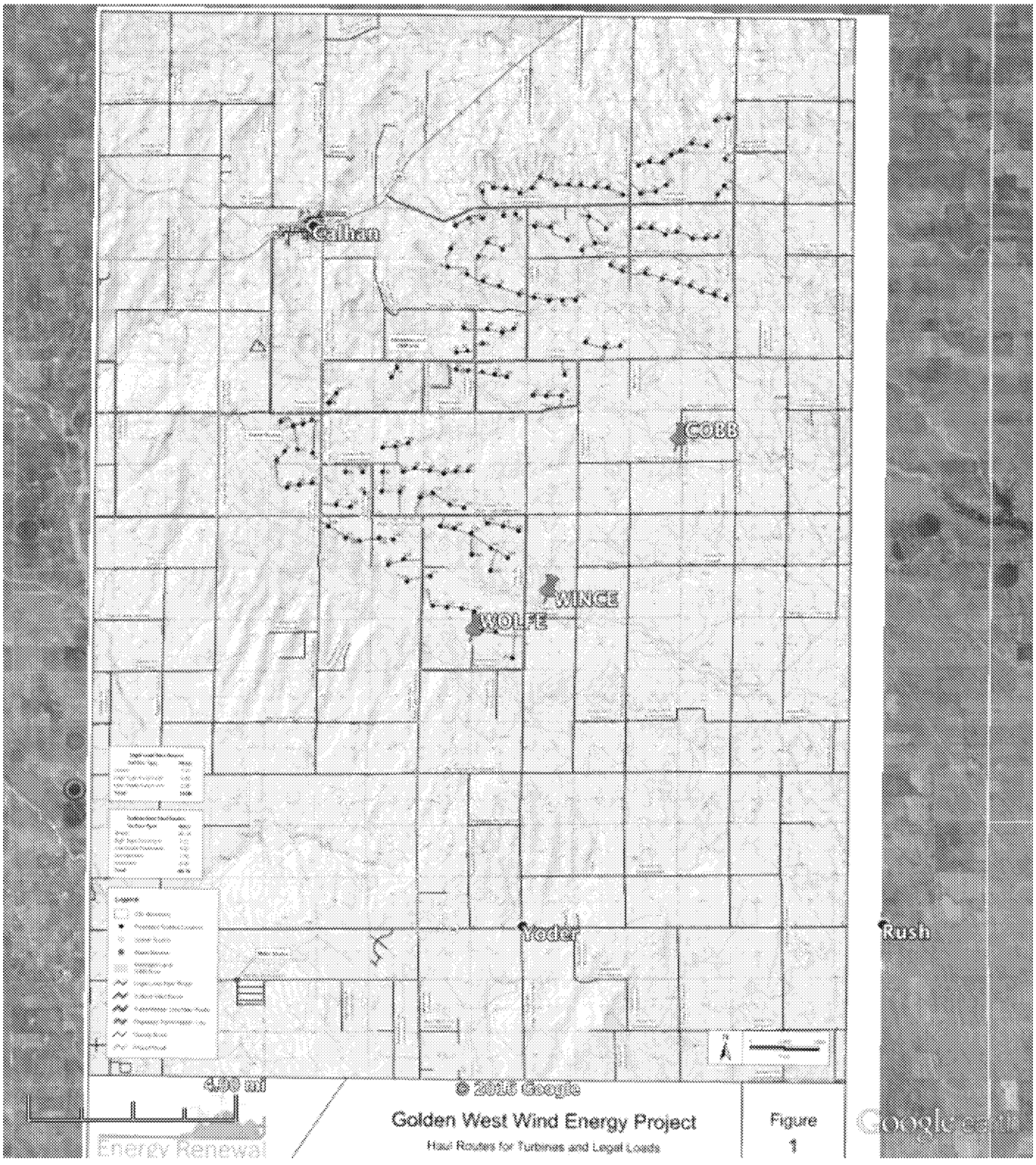
Data: Acquired by neighbors with medical supervision independent of acoustic data acquisition.

2.5 Survey bias description

None. Acoustic data collected blind from journal and medical data sets.

2.6 Project location and weather figures

Figure 1. Monitoring locations and Golden West Facility scaled in Google Earth.



Note: Data acquired inside homes at home locations marked COBB, WINCE, and WOLFE.

Figure 2. Detail map showing proximity of turbines to WOLFE and WINCE homes.

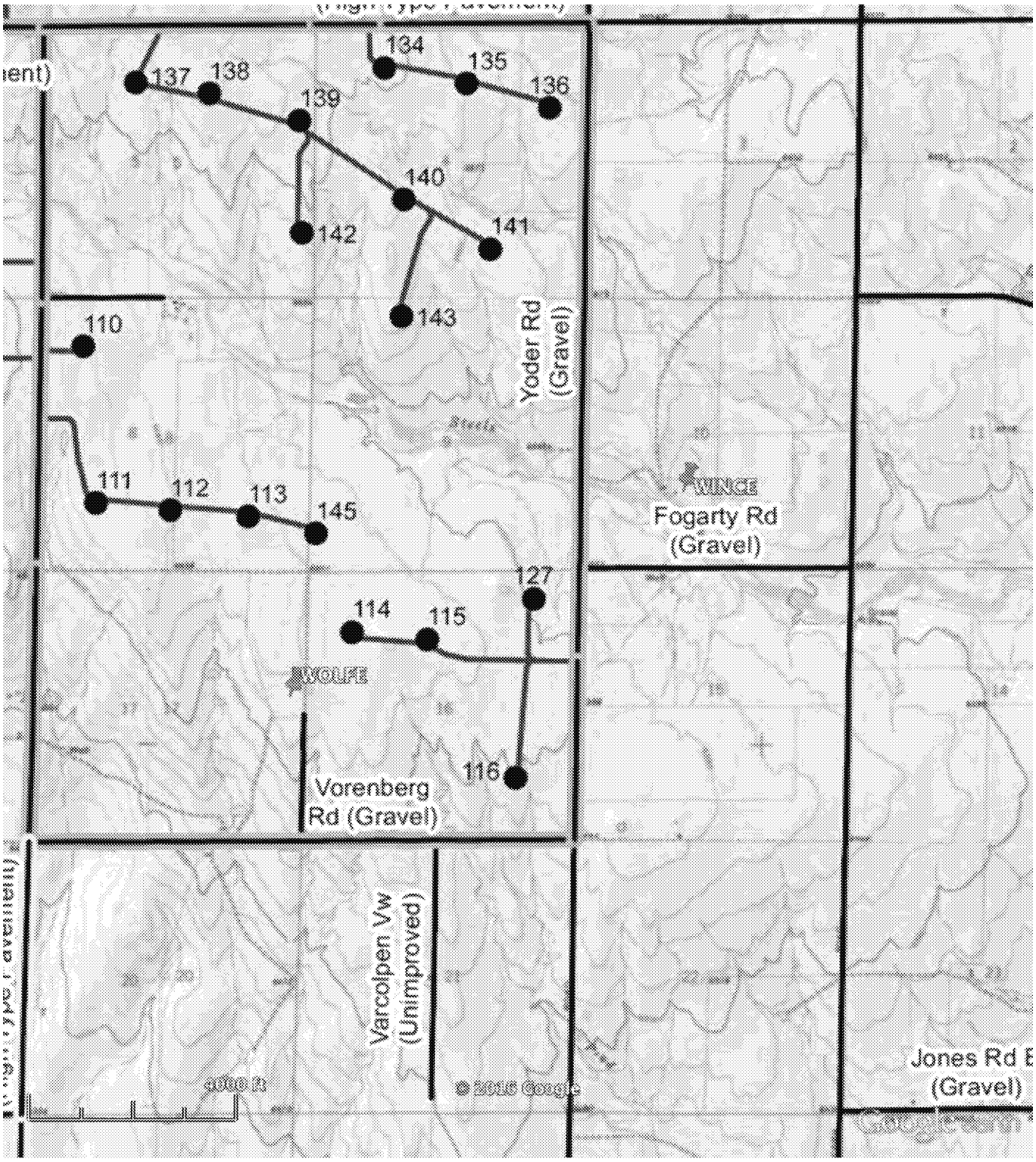


Figure 3. Weather December 11-17, 2015 (nearest airport, KFLY, Peyton, CO).

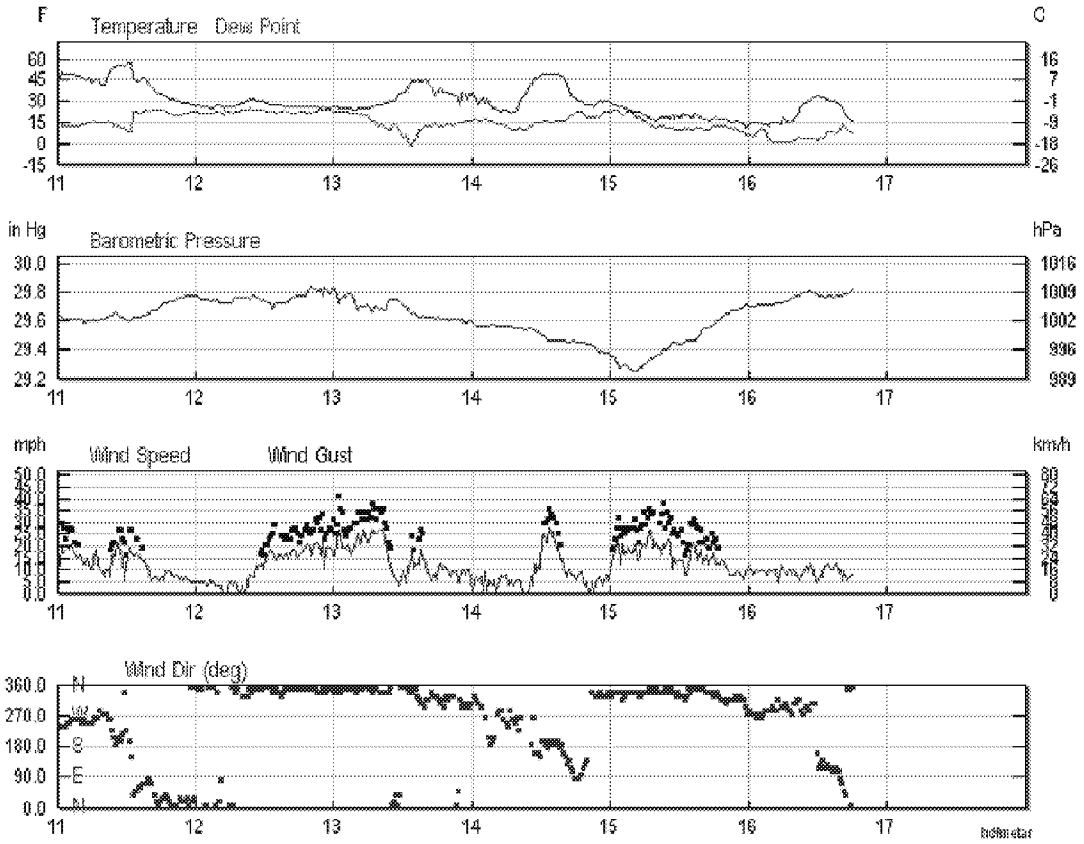
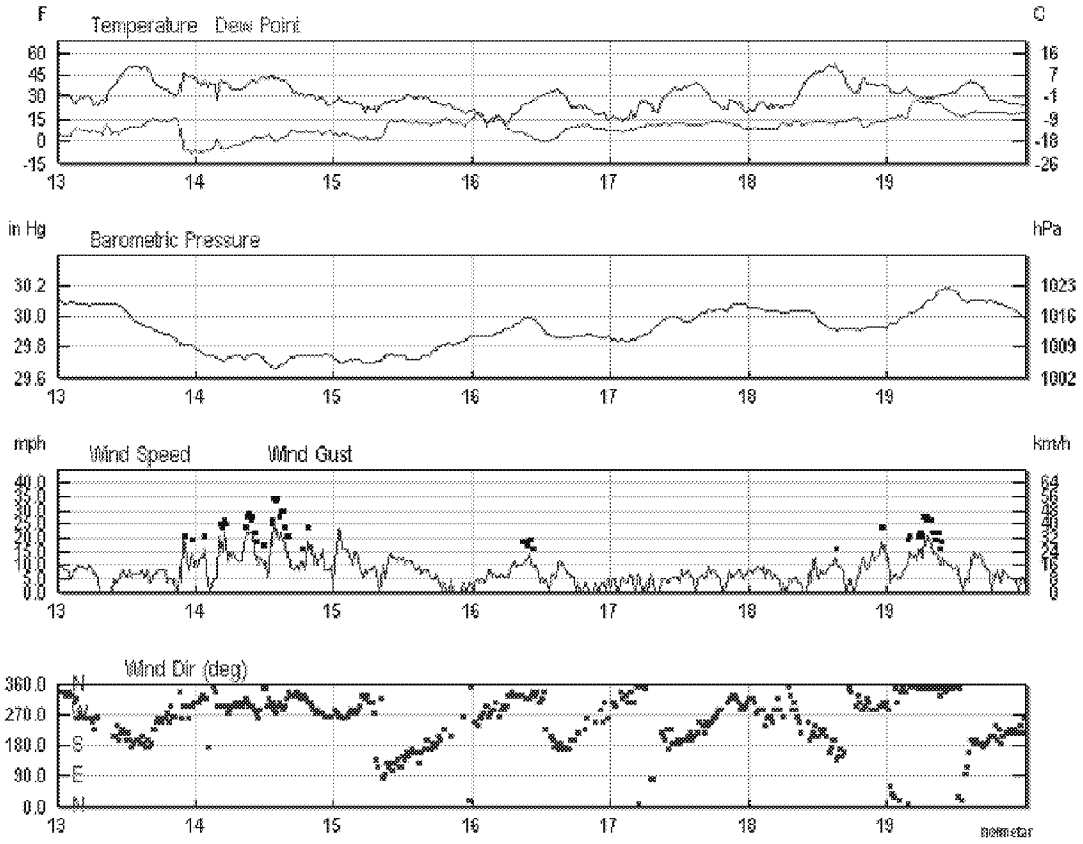


Figure 4. Weather, January 13-19, 2016 (nearest airport, KFLY, Peyton, CO).



3.0 Background Information

3.1 Applicable regulations

El Paso County has a noise regulation, Ordinance Number 02-1, adopted by the Board of County Commissioners on August 1, 2002, which prohibits noise disturbance. The law regulates acoustic pressure oscillations at any frequency including infrasonic (below 20 Hz). From Section 3:

> (e) "Noise Disturbance" means any sound which is:
>
> (1) Harmful or injurious to the health, safety or welfare of any individual; or
>
> (2) Of such a volume, frequency and/or intensity that it unreasonably interferes with the quiet enjoyment of life of an individual of ordinary sensitivity and habits; or
>
> (3) Unreasonably interferes with the value of real property or any business conducted thereon.

and

> (k) "Sound" means an oscillation in pressure, stress, particle displacement, particle velocity or other physical parameter, in a medium with internal forces. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

and

> (m) "Sound Pressure" means the instantaneous difference between the actual pressure and the average or barometric pressure at a given point in space as produced by sound energy

and from Section 4:

> SECTION 4. Prohibited Activities:
>
> (a.) It shall be unlawful to engage in any of the following activities, whether by use of a sound producing device, other device, or other means (either natural or artificial):
>
> 1. To knowingly permit, make, cause to be made or continue any noise disturbance, as defined in Section 3(e) of this Ordinance.

The El Paso County law defines "Sound" as oscillations in pressure (or other physical parameter) at any frequency, and, prohibits noise disturbance due to acoustic oscillations. Large, three-bladed industrial wind turbines emit acoustic oscillations at the blade pass frequency (BPF), defined as:

Blade pass frequency = Rotation rate, rpm * 3 / 60, Hz

A quick conversion is possible between BPF and rpm by using the multiplier or divider 20.

BPF = rpm / 20, Hz; rpm = BPF * 20, rotations per minute

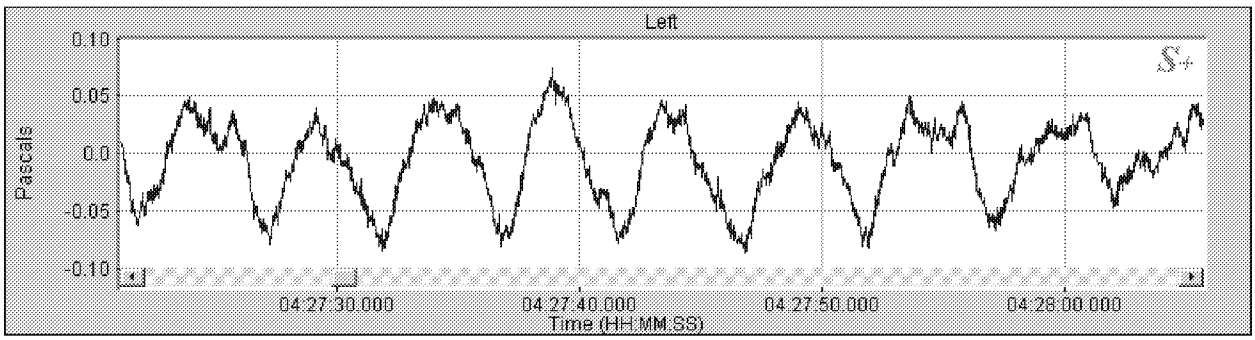
3.2 Acoustic pressure oscillations at infrasonic frequencies

Turbine specifications for the GE product line including the 1.7-100/103 and 1.715-100/103 list the rpm range of approximately 9.75 to 17.5 rpm (0.4875 to 0.875 Hz "blade pass frequency" or BPF) for power production.

There is a 0.2 BPF rate (4 rpm) understood to be associated with firmware- or operator-activated rotation by turbine turning gears to avoid bearing failure, requiring external power for the process.

Measurements during this preliminary investigation confirmed the presence of recurring quasi-impulsive pressure oscillations at 0.2 to 0.8 Hz at the monitoring locations in the vicinity of the Golden West Wind Facility. The presence of harmonics in FFT analysis suggests the pressure oscillations are pulse type waveforms with a narrowed duty cycle, rather than sinusoidal waveforms. This pulse type waveform is consistent with known attributes of wind turbine blade loading. From Malcolm Swinbanks: "The feature of impulsive noise is that there is a large signal present for a short period of time. Consequently, the mean, or root-mean-square (rms) level of the signal may be very low, apparently well below the threshold of hearing, but the peak level is much higher and can be perceived. This ratio of peak-to- mean level is the Crest-Factor."[1]

A time series chart is shown below illustrating the impulsive oscillation waveform at 0.2 Hz rotation, or a 5-second period at the Cobb home, 12-12-15 4:27 AM; winds light or absent at ground level, turbines apparently unpowered and turned by firmware at 4 rpm with internal turning gear using grid power.



The recurring yet non-repeating pulse waveform at the BPF is associated to the variable loading and release of each blade's power accumulation as it swings through the fastest wind aloft and then down off top azimuth, and also, from interaction of each blade encountering the slowed-wind profile in the vertical bow wake upwind of the turbine tower.[2] It is understood that wind turbine firmware, relying on wind data from sensors at only one central elevation at the hub, is unable to keep blade angles optimized for each

[1] Malcolm Swinbanks, Re: Case No U-15899, to Executive Secretary, MPSC, 12-8-2009.
[2] Personal communications with Malcolm Swinbanks and Stephen E. Ambrose, INCE (Board Cert.).

blade along its length as the blades swing through hundreds of feet variations in wind speed, vertical and veer shear and turbulence often exceeding manufacturer operating specifications.

Dynamic stall, excessive blade moments (range of motion) and excessive bearing loads have been documented by turbine performance research for wind turbines operated in environments with wind conditions exceeding manufacturer operating specifications. Acoustically, it appears that blade unloading and dynamic stall result in blades swinging flapwise like large paddles or long speakers, amplifying blade moments and recurring pulsatile oscillations at the blade pass frequency. Sudden encounters with changes in wind speed or direction may shock blades into ringing at their primary structural resonant frequencies which are also infrasonic.

It is understood that it is possible to rotate turbines at up to full rpm with no power output using feathered blades (no angle to wind) and externally applied voltage to internal gearing. In such operations, the blades would still be subjected to wind shear and turbulence and exhibit cyclical flapwise moments resulting in acoustic oscillations at the blade pass frequencies.

3.3 Motion sickness from oscillations

International ISO standard 9996:2000 defines motion sickness from exposure to actual or perceived oscillatory motion; "*motion sickness is a commonly experienced and sometimes severe but reversible (i. e. physiological) disorder specifically associated with exposure to actual or perceived oscillatory motion in the frequency range 0,1 to 1 Hz. One or more of a constellation of symptoms (with or without frank vomiting) may affect the sufferer.* "

Naval studies identified acceleration oscillations in the range of 0.1 to 1 Hz as associated with motion sickness, with sickness strongest at about 0.2 Hz. The association of acoustic oscillations to motion sickness was documented in studies of large wind turbine noise emissions by Dr. Paul Schomer.

Review of deliberate increases in wind turbine size over several decades indicates that the rotational rate (revolutions per minute or rpm) and the blade pass frequency (BPF) have dropped, as size increased, into the range of motion sickness identified in ISO 9996:2000, 0.1 to 1 Hz and studied in naval research on motion sickness. Figure 5 below illustrates the drop in BPF with turbine size. Blade pass frequencies observed in spectrogram analysis at homes near the vicinity of the Golden West Wind Facility fall within 0.2 to 0.85 Hz, within the range associated to motion sickness.

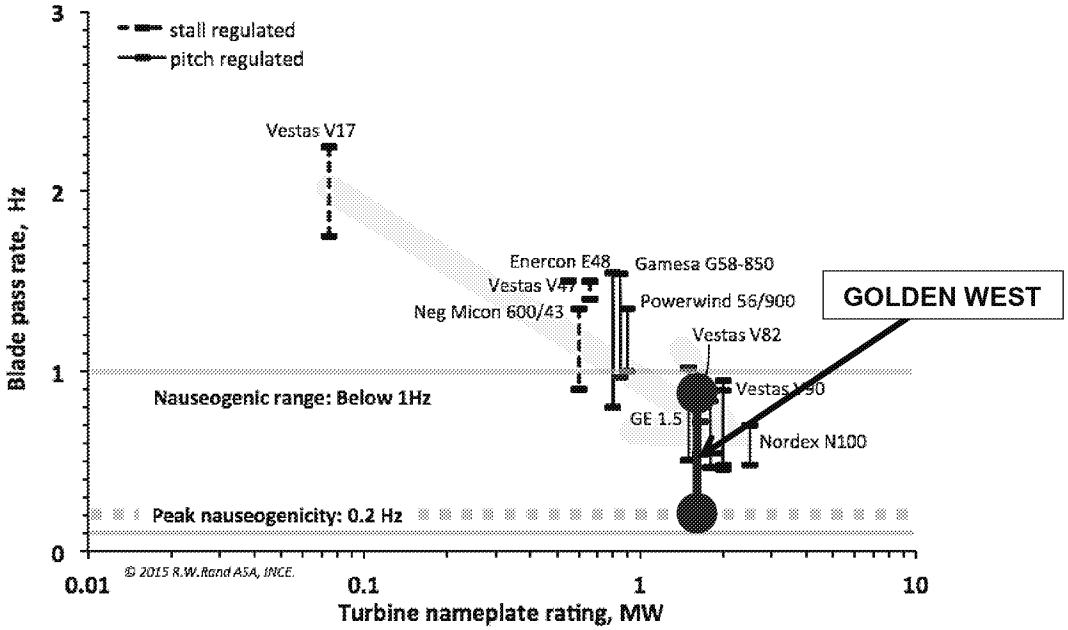
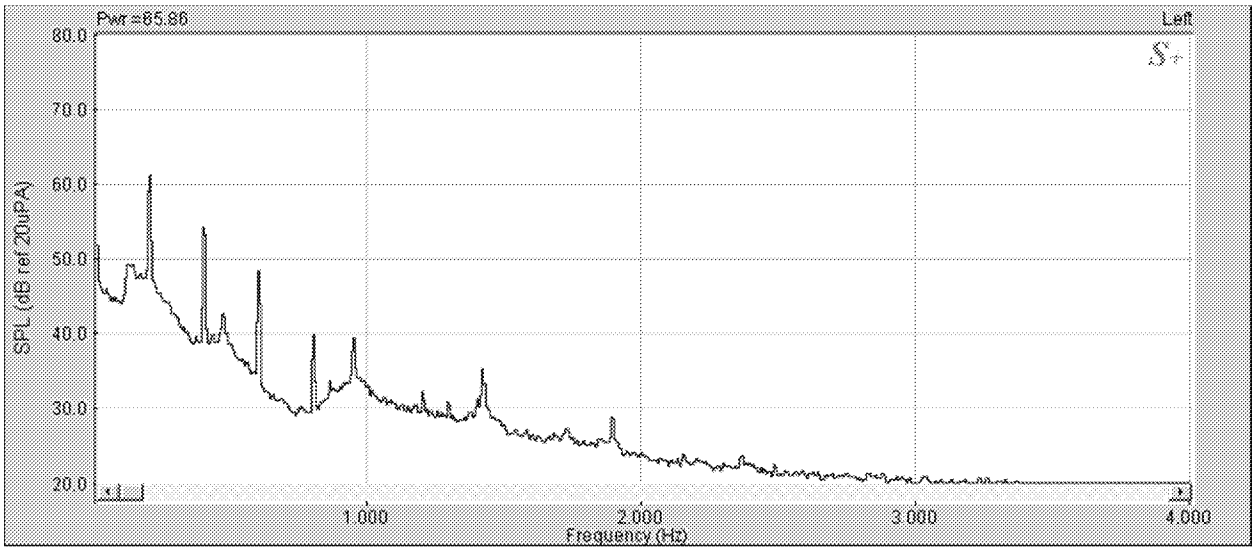


Figure 5. Blade pass rate (frequency), Hz for various wind turbine models. Nauseogenicity range is 0.1 to 1 Hz with peak nausea potential noted at 0.2 Hz. In a limited literature search, motion sickness reports were not found for older, smaller turbines, which have blade pass frequencies outside the nauseogenic range. This figure includes minor syntax changes from a figure presented at the at the 4pNS Wind Turbine Noise II technical at the 2015 Acoustical Society of America Meeting in Pittsburgh.

4.0 Spectrum analysis of BPF oscillations

Power levels were computed for several monitoring segments by summing the first four FFT components for specific turbine rotations when the traces were clearly visible and uncontaminated by other noise. For a 0.2 Hz rotation, the FFT power for 0.2, 0.4, 0.6, and 0.8 Hz were summed using the center and two adjacent bins for each harmonic. Similar summations were performed for other rotations such as 0.85 Hz. Totalized RMS levels ranged from 56 to 70 dB re 20uPA, with peak levels from 71 to 89 dB. Crest-Factors were obtained directly in analysis software and applied to obtain the peak BPF sound level.

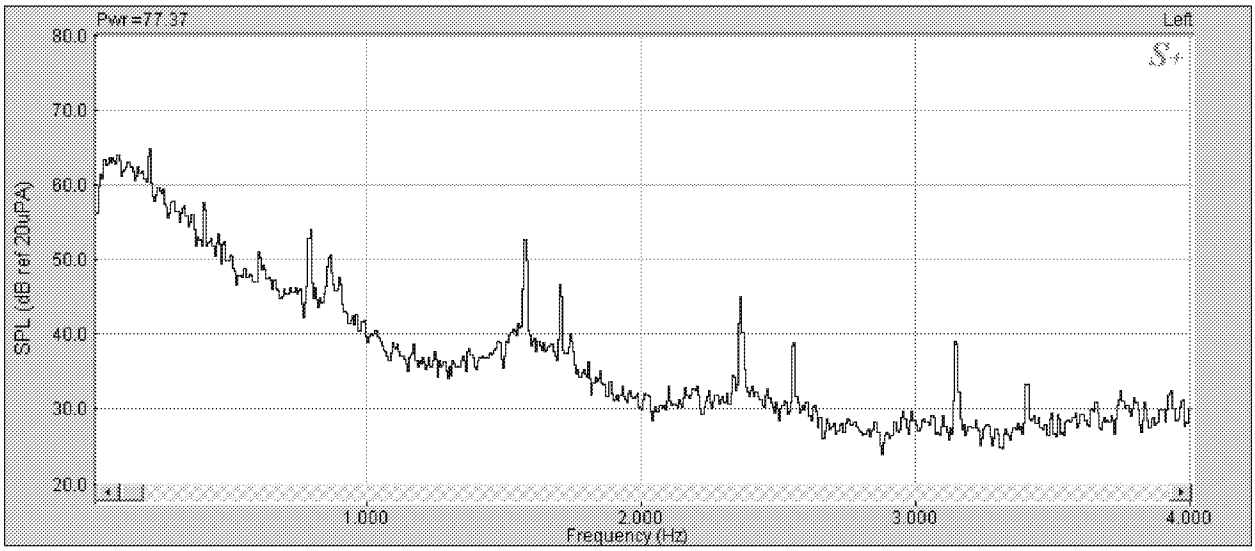
4.1 Example 1. Spectrum analysis, Cobb Home, 12-12-15, BPF 0.2 Hz.



DATE	12/12/15
START TIME	1:15 AM
STOP TIME	6:15 AM
DURATION	5.00 hours

CALC OSCILLATION PWR	F, Hz	Bin, dB	Exp
BPF BIN-1	0.1953	59.2	825266.7
BPF BIN-1	0.2014	61.4	1389442.6
BPF BIN+1	0.2075	52.6	180170.1
2XBPF BIN-1	0.3906	43.7	23223.5
2XBPF	0.3967	54.4	277437.8
2XBPF+1	0.4028	53.4	218142.3
3XBPF BIN-1	0.592	41.9	15379.6
3XBPF	0.5981	48.6	72548.8
3XBPF+1	0.6042	44.3	27018.8
4XBPF BIN-1	0.7935	36.9	4918.4
4XBPF	0.7996	40.1	10188.8
4XBPF+1	0.8057	33.9	2476.3
TOTAL, dB re 20uPA			**64.8**
TOTAL, Pascals, RMS			**0.035**
CREST FACTOR, dB			17.6
Peak level, dB			**82.4**

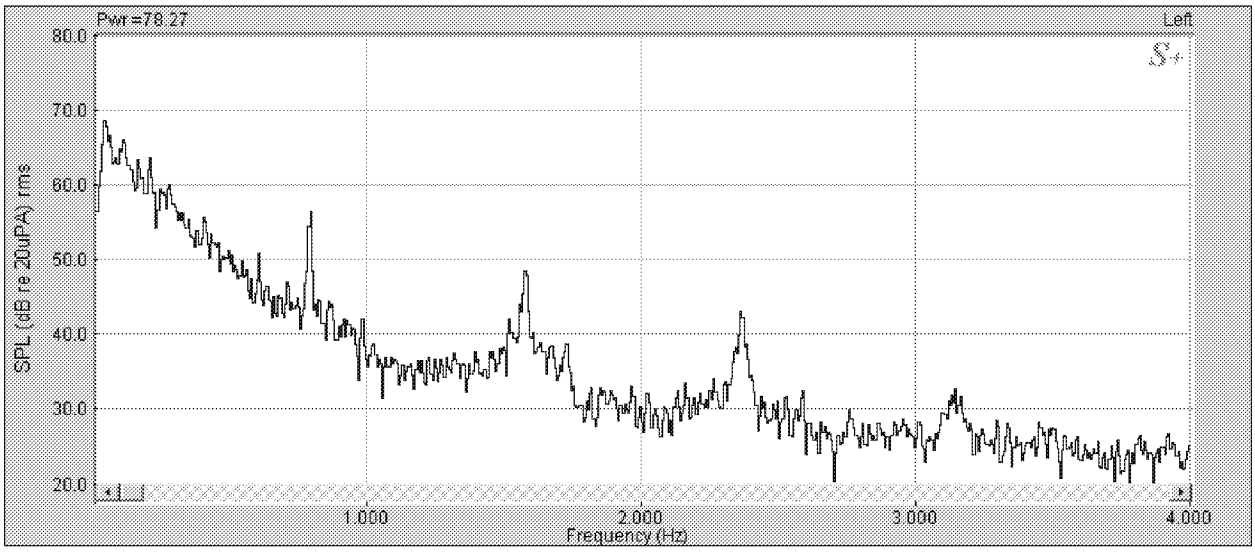
4.1 Example 2. Spectrum analysis, Cobb Home, 12-13-15, BPF 0.2, 0.79, and 0.85 Hz.



DATE	12/13/15
START TIME	6:15 PM
STOP TIME	6:45 PM
DURATION	0.50 hours

	0.2 HZ			0.78 Hz			0.85 Hz		
CALC OSCILLATION PWR	F, Hz	Bin, dB	Exp	F, Hz	Bin, dB	Exp	F, Hz	Bin, dB	Exp
BPF BIN-1	0.1953	63.9	2480279.9	0.7751	46.7	46247.0	0.8484	49.1	81903.8
BPF BIN-1	0.2014	65.0	3152360.7	0.7813	53.0	200254.0	0.8545	50.5	110926.0
BPF BIN+1	0.2075	60.4	1087195.1	0.7874	54.3	268226.1	0.8606	50.8	119487.3
2XBPF BIN-1	0.3967	57.8	602700.8	1.5625	46.3	42769.7	1.6907	39.4	8760.2
2XBPF	0.4028	56.7	467546.3	1.5686	52.7	187047.7	1.6968	46.8	48367.2
2XBPF+1	0.4089	52.0	159569.0	1.5747	50.0	100755.2	1.7029	45.2	33395.9
3XBPF BIN-1	0.5981	51.1	129169.2	2.3499	41.7	14642.2	2.5452	38.7	7441.6
3XBPF	0.6042	50.4	110293.4	2.356	45.2	33433.1	2.5513	39.1	8039.7
3XBPF+1	0.6104	48.7	74723.3	2.3621	40.5	11095.5	2.5574	31.8	1513.1
4XBPF BIN-1	0.7996	45.0	31683.0	3.1372	39.3	8498.8	3.3936	33.4	2207.1
4XBPF	0.8057	46.4	43980.1	3.1433	38.8	7545.5	3.3997	33.5	2244.0
4XBPF+1	0.8118	44.8	30323.4	3.1494	32.4	1752.2	3.4058	28.9	784.3
TOTAL, dB re 20uPA			**69.2**			**59.6**			**56.3**
TOTAL, Pascals, RMS			0.058			0.019			0.013
CREST FACTOR, dB			14.3			14.3			14.3
Peak level, dB			**83.5**			**73.9**			**70.6**

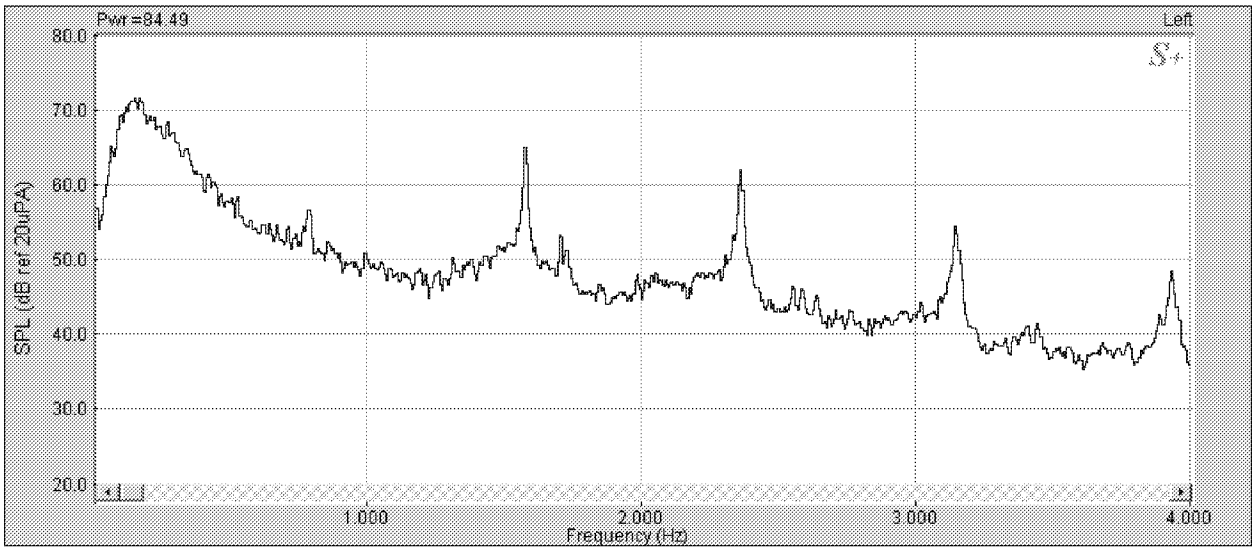
4.1 Example 3. Spectrum analysis, Cobb Home, 12-17-15, BPF 0.78 Hz.



DATE	12/17/15
START TIME	8:10 PM
STOP TIME	8:25 PM
DURATION	0.25 hours

CALC OSCILLATION PWR	F, Hz	Bin, dB	Exp
BPF BIN-1	0.7751	48.5	71339.8
BPF BIN-1	0.7813	54.6	289792.5
BPF BIN+1	0.7874	56.5	448172.3
2XBPF BIN-1	1.5625	45.6	36015.8
2XBPF	1.5686	48.6	72421.4
2XBPF+1	1.5747	48.0	62543.8
3XBPF BIN-1	2.3499	40.0	10082.5
3XBPF	2.356	43.2	20918.2
3XBPF+1	2.3621	42.4	17341.4
4XBPF BIN-1	3.1311	31.0	1258.4
4XBPF	3.1372	32.9	1967.6
4XBPF+1	3.1433	29.6	905.8
TOTAL, dB re 20uPA			**60.1**
TOTAL, Pascals, RMS			**0.020**
CREST FACTOR, dB			13.1
Peak level, dB			**73.2**

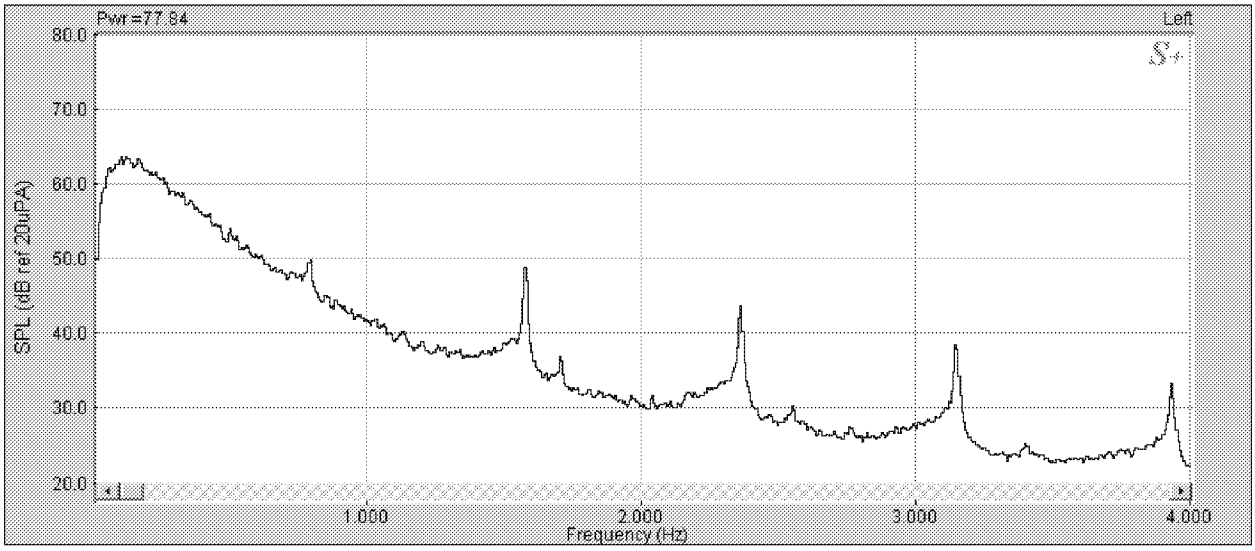
4.1 Example 4. Spectrum analysis, Wolfe home, 12-17-15, BPF 0.78 Hz.



DATE	12/17/15
START TIME	10:40 PM
STOP TIME	11:40 PM
DURATION	1.00 hours

CALC OSCILLATION PWR	F, Hz	Bin, dB	Exp
BPF BIN-1	0.7751	55.6	367190.8
BPF BIN-1	0.7813	56.8	478888.6
BPF BIN+1	0.7874	56.1	411701.8
2XBPF BIN-1	1.5625	59.8	954050.8
2XBPF	1.5686	65.1	3225940.1
2XBPF+1	1.5747	63.0	1975497.1
3XBPF BIN-1	2.3499	60.1	1020352.4
3XBPF	2.356	62.1	1635316.1
3XBPF+1	2.3621	59.3	846885.7
4XBPF BIN-1	3.1311	51.9	155949.2
4XBPF	3.1372	54.6	291209.0
4XBPF+1	3.1433	53.7	231877.6
TOTAL, dB re 20uPA			**70.6**
TOTAL, Pascals, RMS			**0.068**
CREST FACTOR, dB			18.2
Peak level, dB			**88.8**

4.1 Example 5. Spectrum analysis, Wince home, 1-19-16, BPF 0.78 Hz.



DATE	12/17/15
START TIME	6:00 PM
STOP TIME	11:00 PM
DURATION	5.00 hours

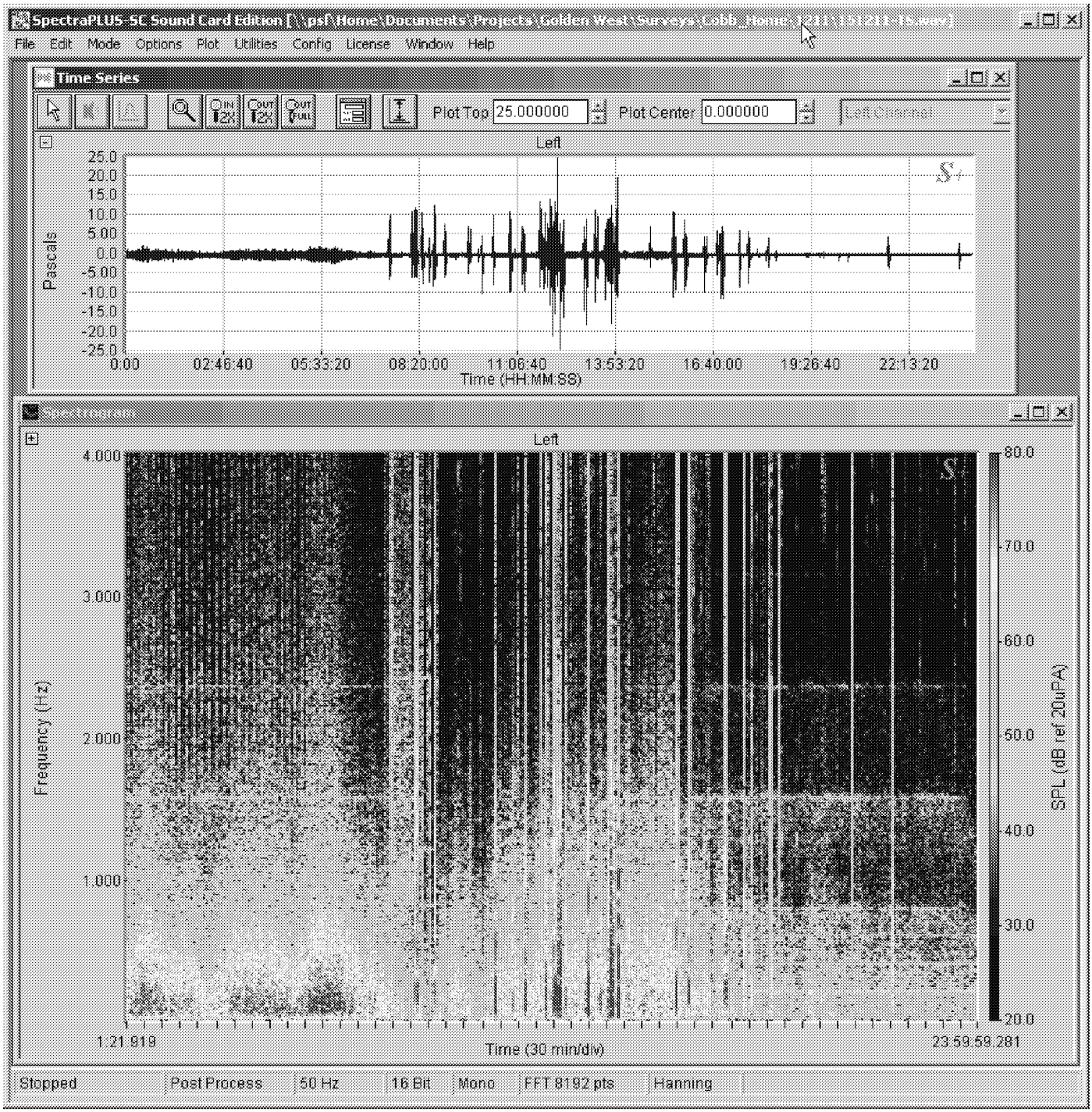
CALC OSCILLATION PWR	F, Hz	Bin, dB	Exp
BPF BIN-1	0.7751	48.5	70428.0
BPF BIN-1	0.7813	49.7	93111.6
BPF BIN+1	0.7874	50.0	100601.3
2XBPF BIN-1	1.5625	44.9	30595.2
2XBPF	1.5686	49.1	80677.5
2XBPF+1	1.5747	47.2	52168.2
3XBPF BIN-1	2.3499	42.3	16845.2
3XBPF	2.356	43.9	24320.6
3XBPF+1	2.3621	40.4	10961.0
4XBPF BIN-1	3.1311	35.1	3223.1
4XBPF	3.1372	38.7	7435.5
4XBPF+1	3.1433	38.0	6360.2
TOTAL, dB re 20uPA			**57.0**
TOTAL, Pascals, RMS			**0.014**
CREST FACTOR, dB			17.3
Peak level, dB			**74.3**

5.0 Infrasonic spectrograms

Daily spectrograms are shown in this section for the three homes monitored:

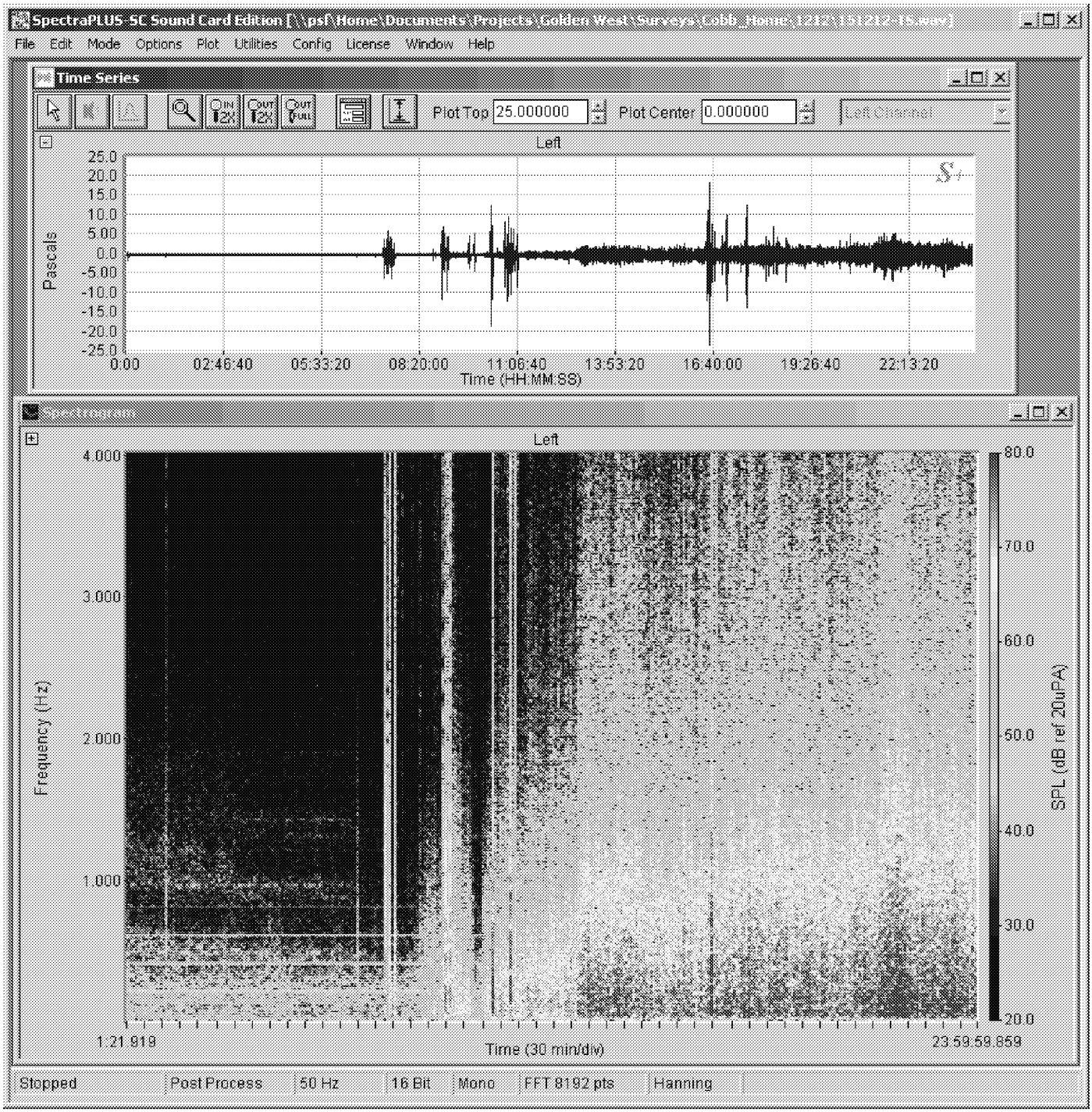
Cobb home: December 11-17, 2015
Wolfe home: December 11-17, 2015
Wince home: January 13-19, 2016

Location: COBB HOME
Date: 12/11/2015



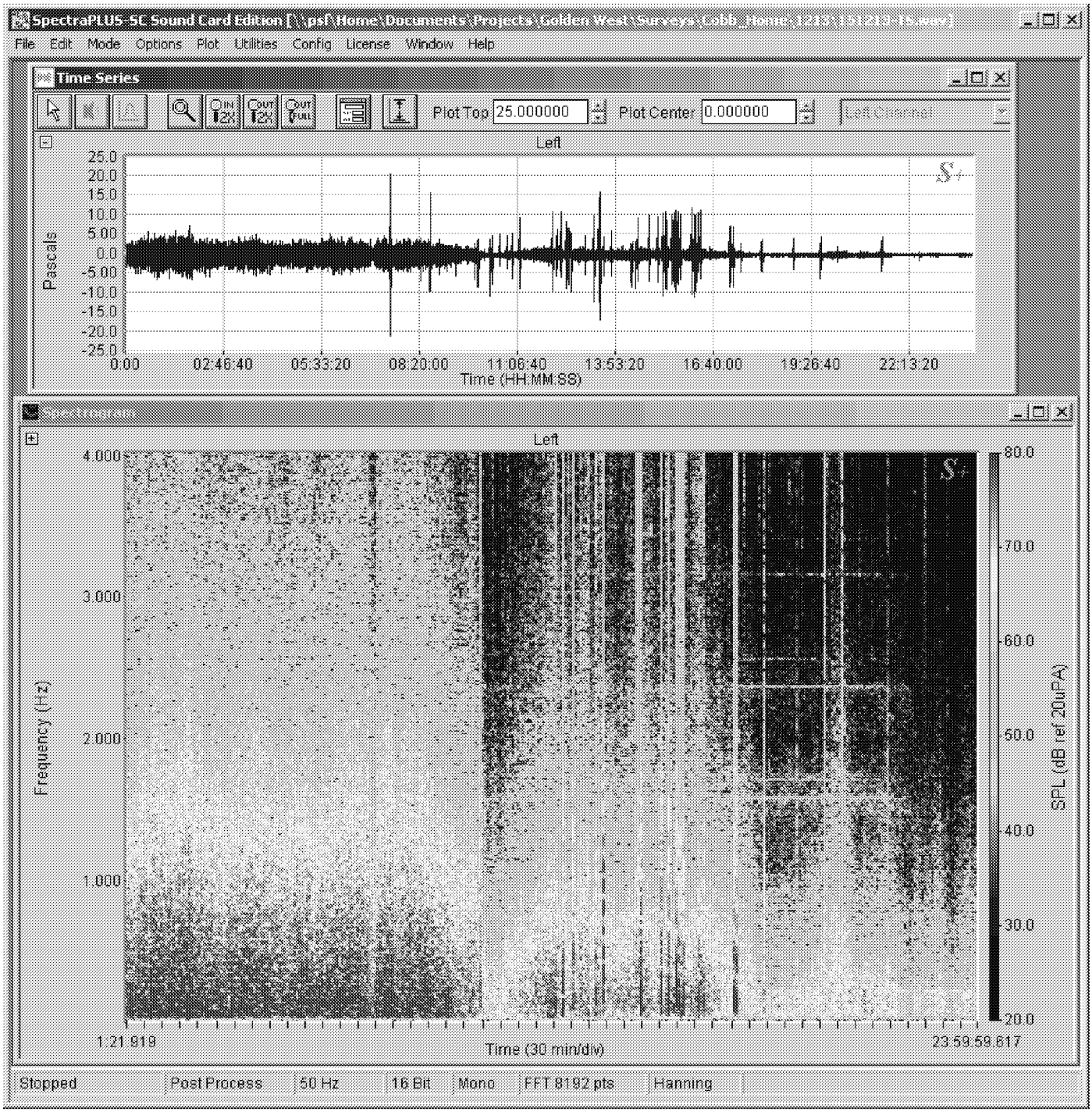
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.79 Hz (15.8 rpm) and 0.2 Hz (4 rpm) was observed. Multiple rotations in the range of 0.6 to 0.7 Hz were observed consistent with differing rotation rates from a number of turbines at some distance or at lower power.

Location: COBB HOME
Date: 12/12/2015



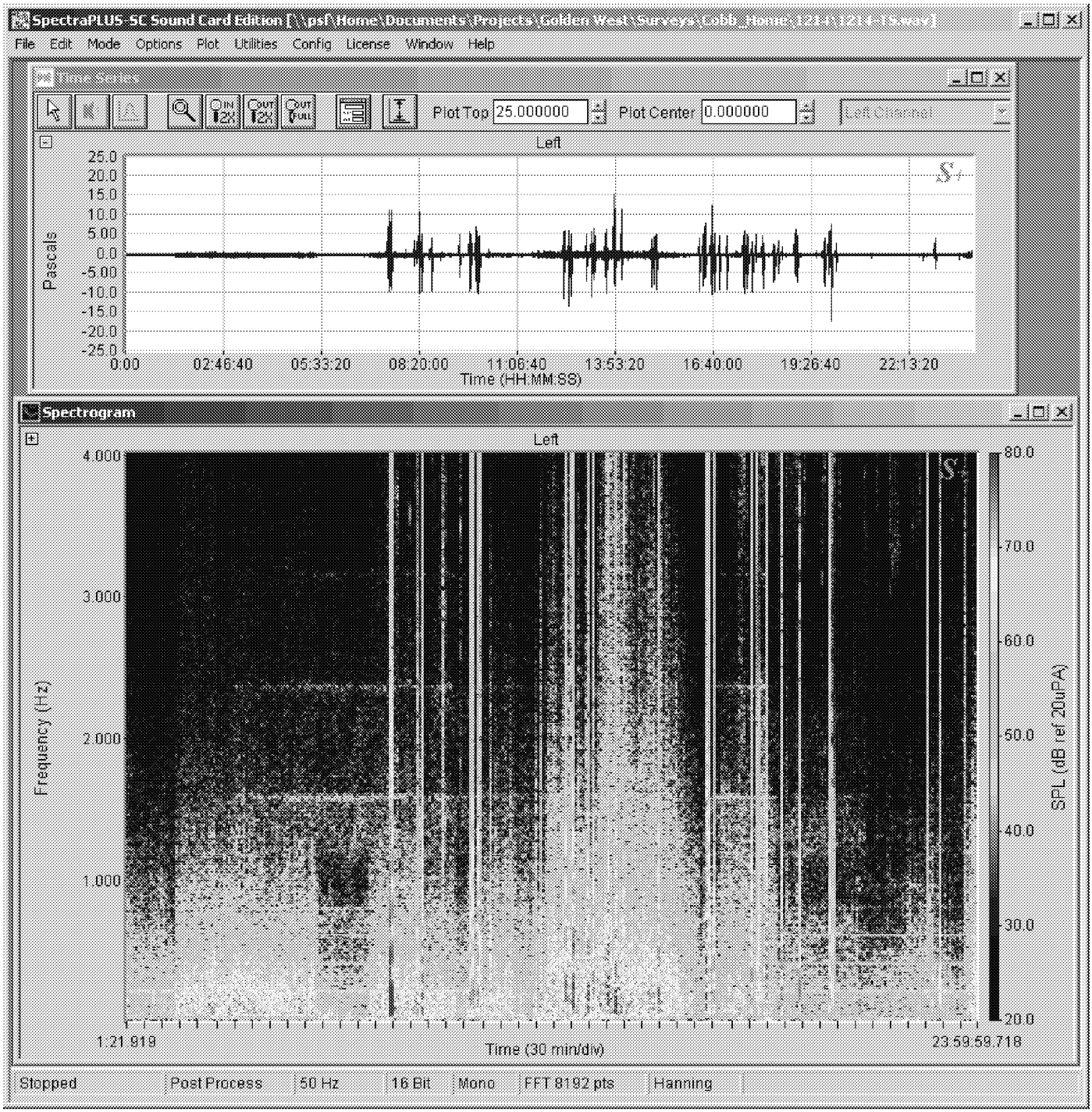
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.2 Hz (4 rpm) and 0.48 Hz (9.6 rpm) were observed. Multiple lower intensity traces in the range of 0.4 to 0.7 Hz were observed consistent with differing rotation rates from a number of turbines at some distance or at lower power. Slowing of multiple turbines from night before was observed to continue through to about 6:30 AM.

Location: COBB HOME
Date: 12/13/2015



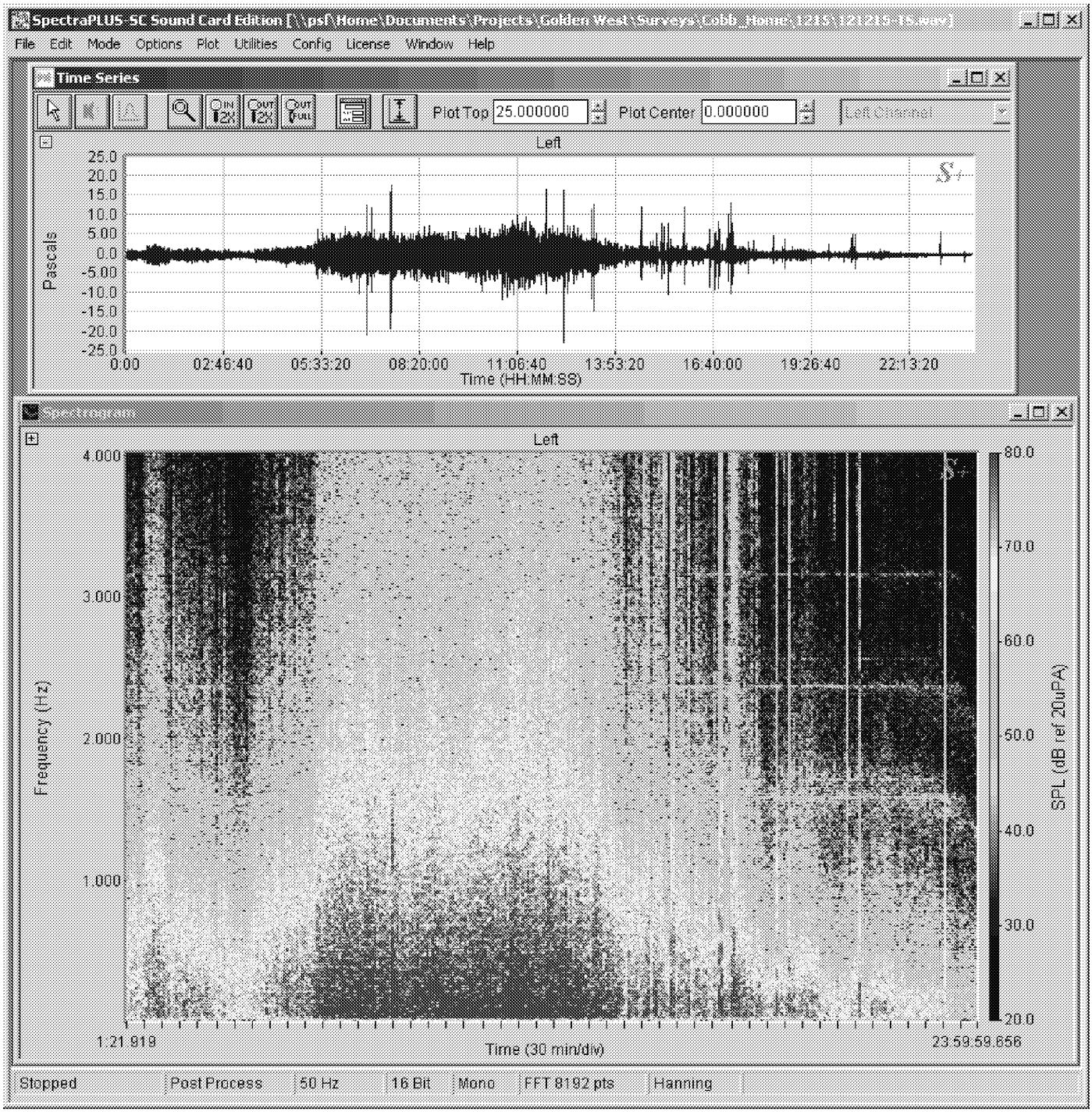
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.2 Hz (4 rpm), 0.79 Hz (15.8 rpm) and 0.85 Hz (19 rpm) were observed during the evening hours.

Location: COBB HOME
Date: 12/14/2015



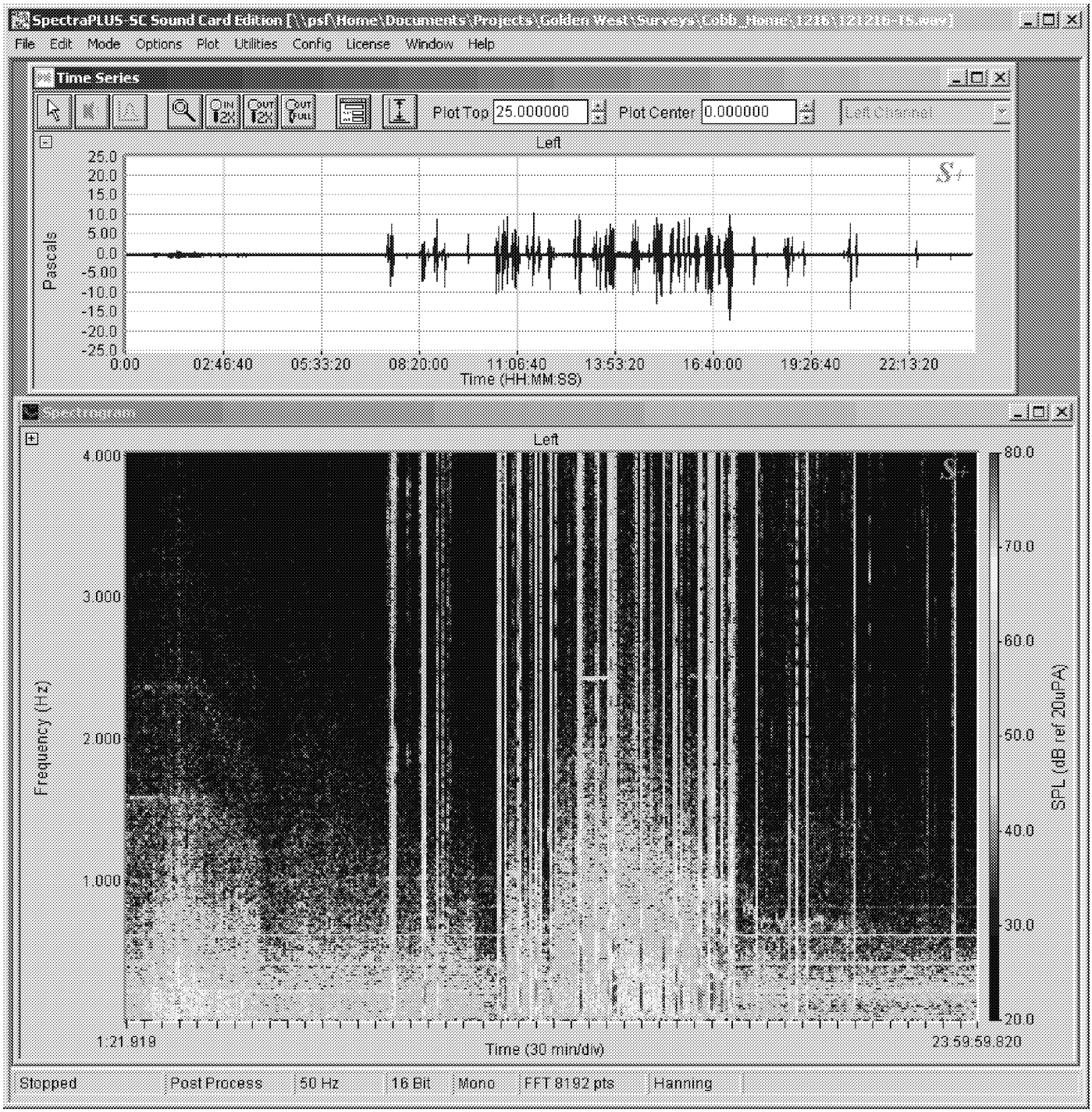
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.79 Hz (15.8 rpm) and 0.2 Hz (4 rpm) were observed.

Location: COBB HOME
Date: 12/15/2015



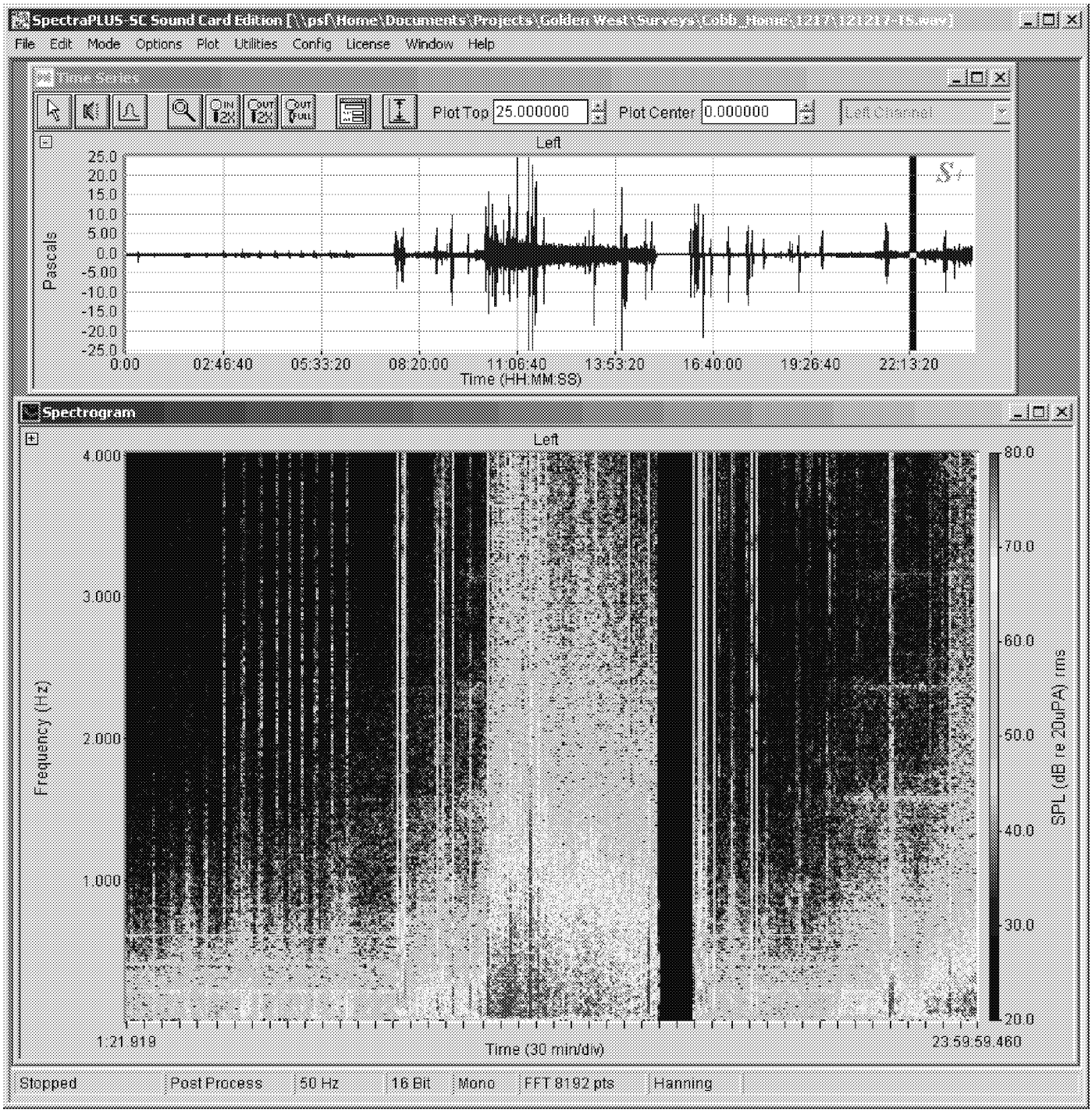
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.79 Hz (15.8 rpm) and 0.86 Hz (17.2 rpm) were observed.

Location: COBB HOME
Date: 12/16/2015



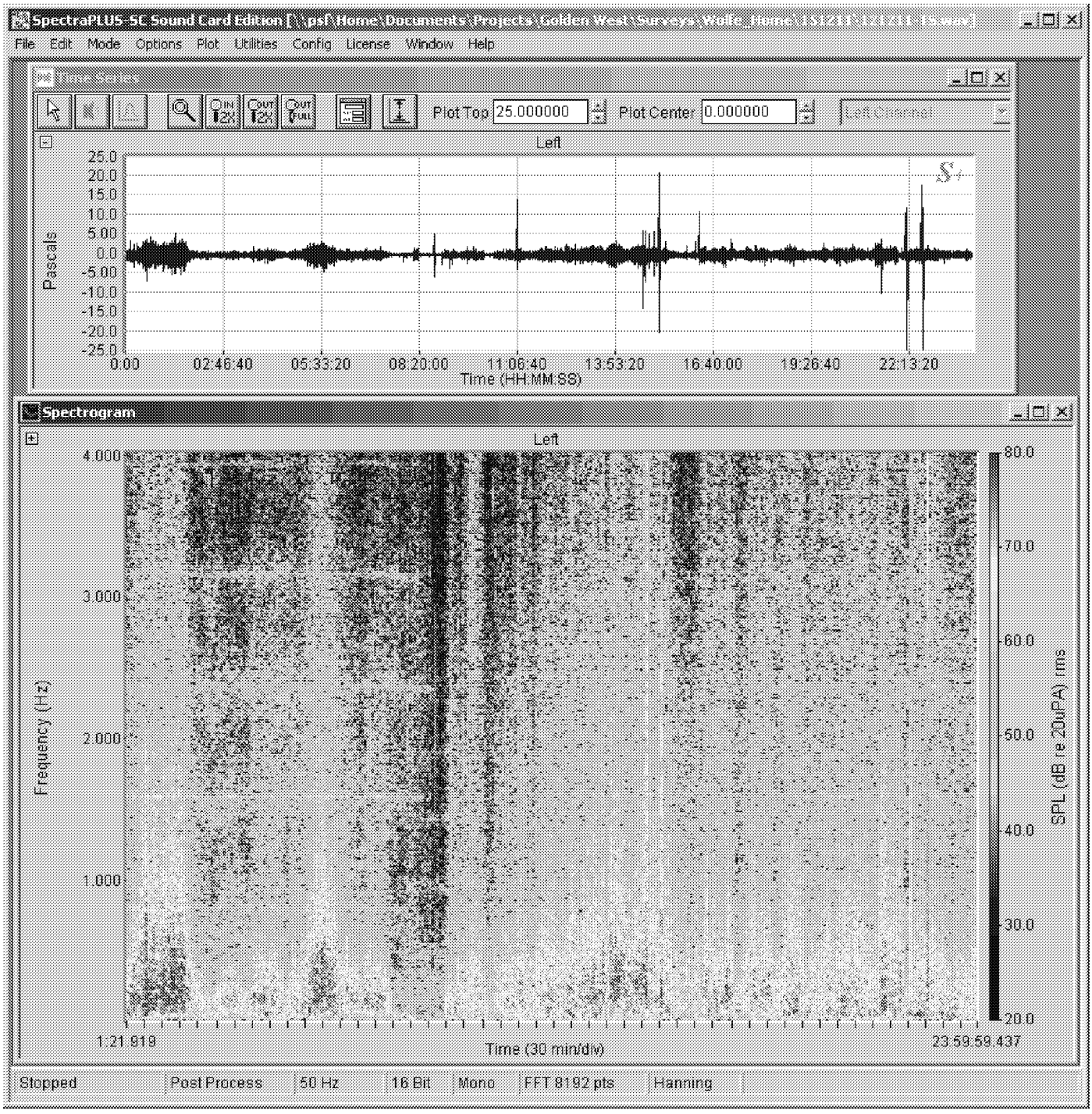
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.79 Hz (15.8 rpm) were observed until about 2:30 AM and 0.2 Hz (4 rpm) was observed the remainder of the day.

Location: COBB HOME
Date: 12/17/2015



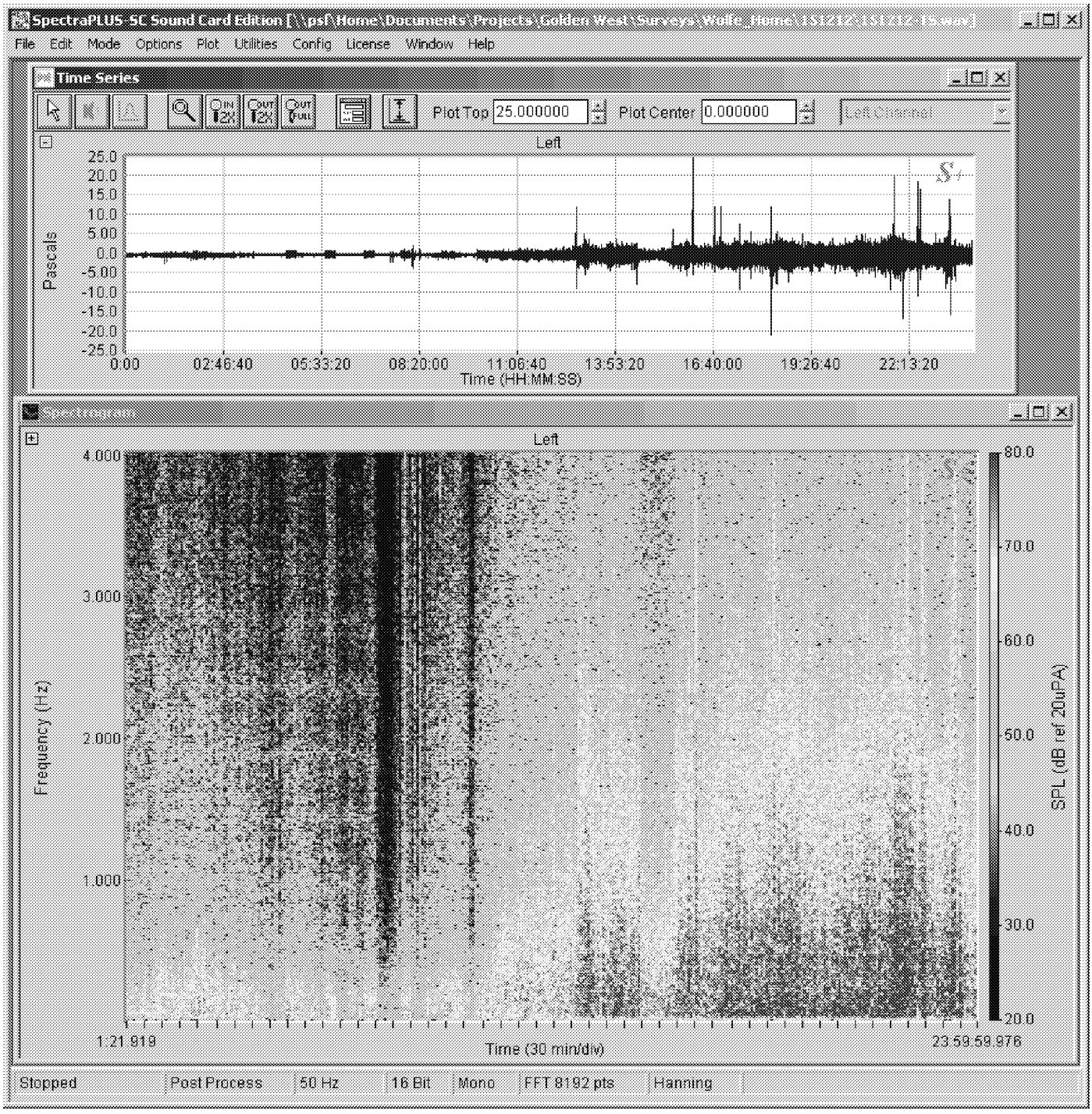
Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.2 Hz (4 rpm) during the first part of the day, with 0.79 Hz (15.8 rpm) rotations observed starting about daybreak, not visible in the mid-afternoon, and reappearing around 8 PM. Gap 3-4 PM for system maintenance.

Location: WOLFE HOME
Date: 12/11/2015



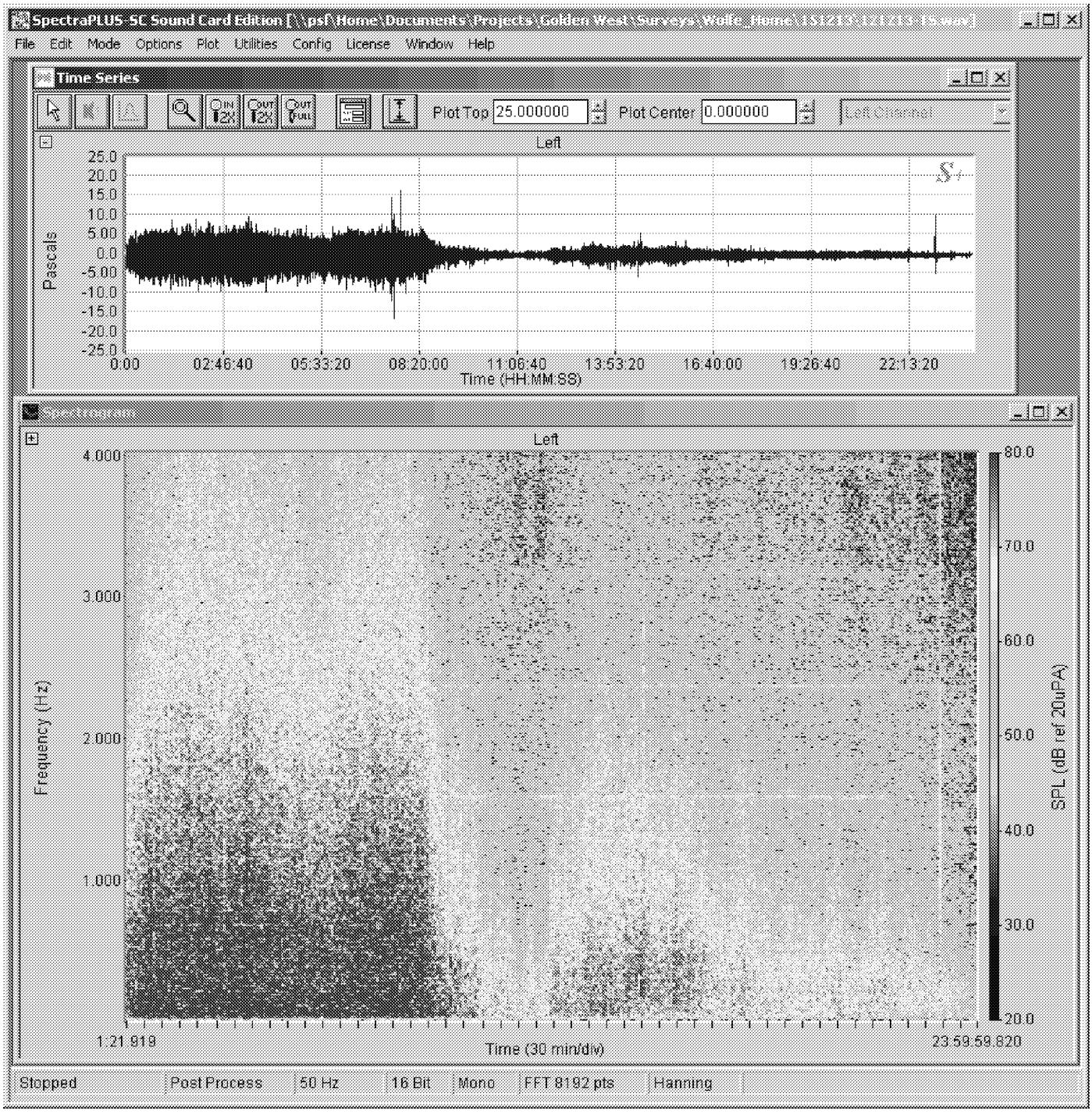
Note: Horizontal traces indicate wind turbine rotation. Rotations at 0.79 Hz (15.8 rpm) and 0.48 Hz (9.6 rpm) were observed.

Location: WOLFE HOME
Date: 12/12/2015



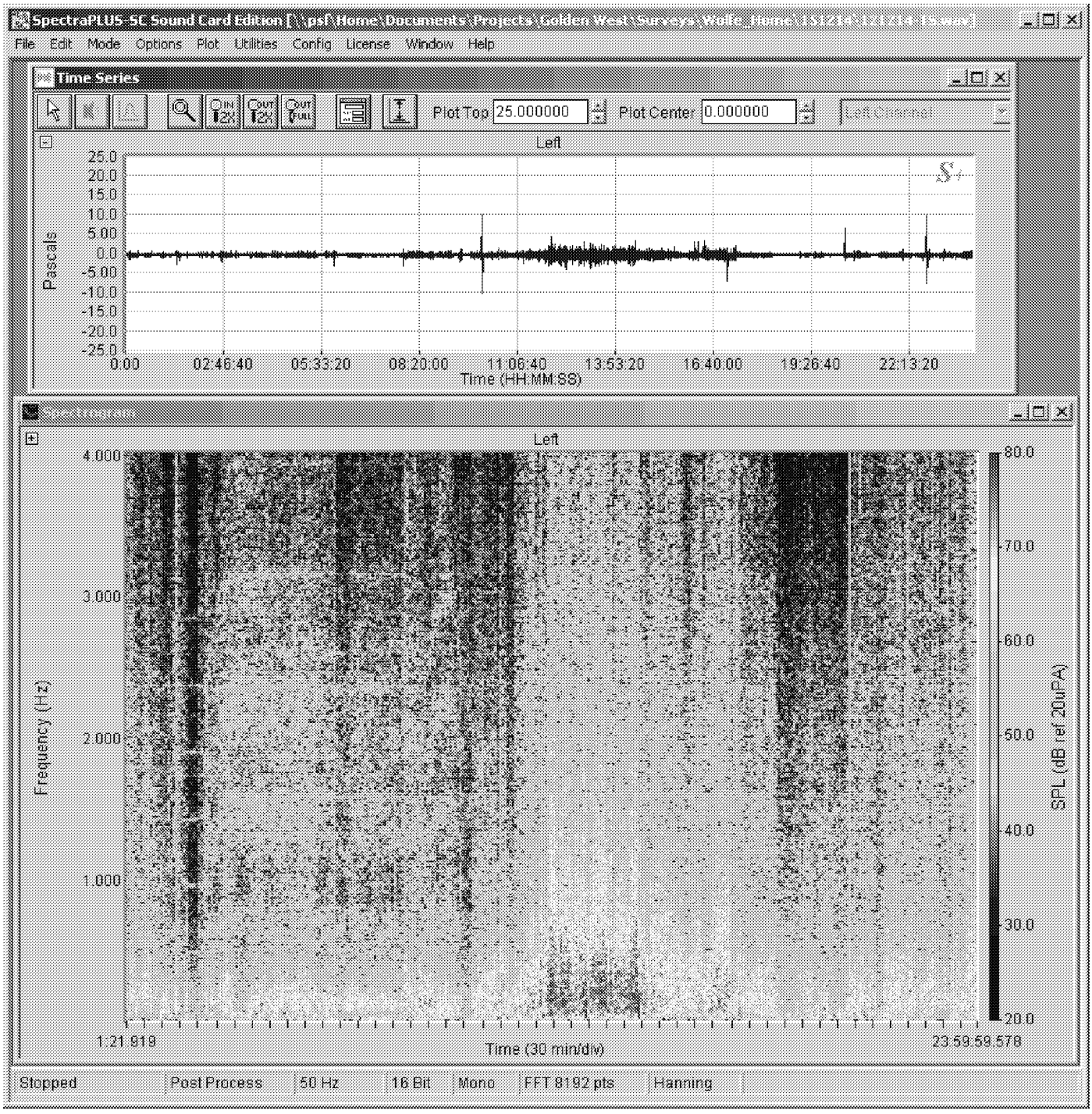
Note: Horizontal traces indicate wind turbine rotation. Rotations were observed at 0.47 Hz (15.4 rpm) during early hours until 7 AM and 0.79 Hz (15.8 rpm) after 12 PM.

Location: WOLFE HOME
Date: 12/13/2015



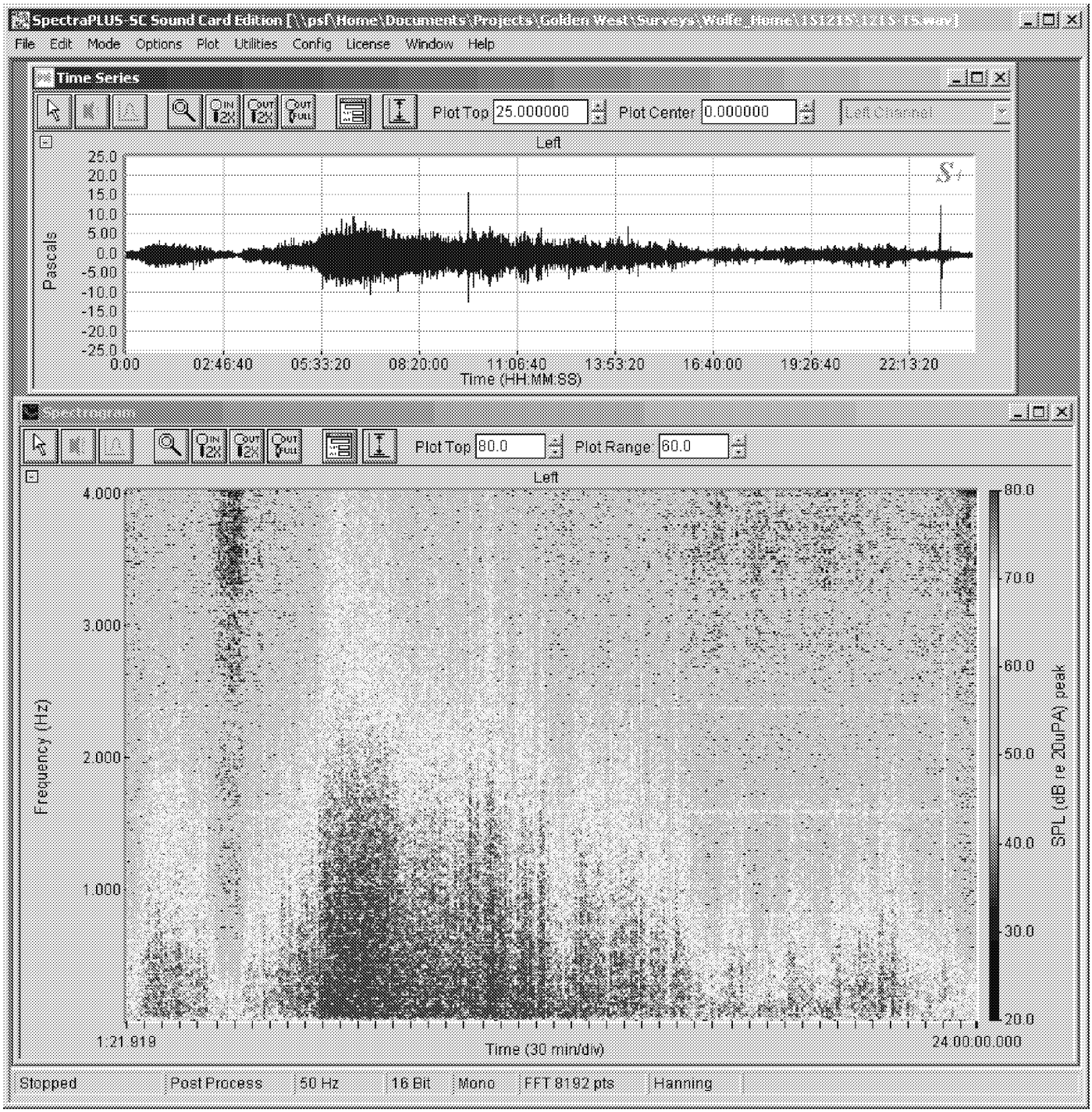
Note: Horizontal traces indicate wind turbine rotation. Rotation was observed at 0.79 Hz (15.8 rpm).

Location: WOLFE HOME
Date: 12/14/2015



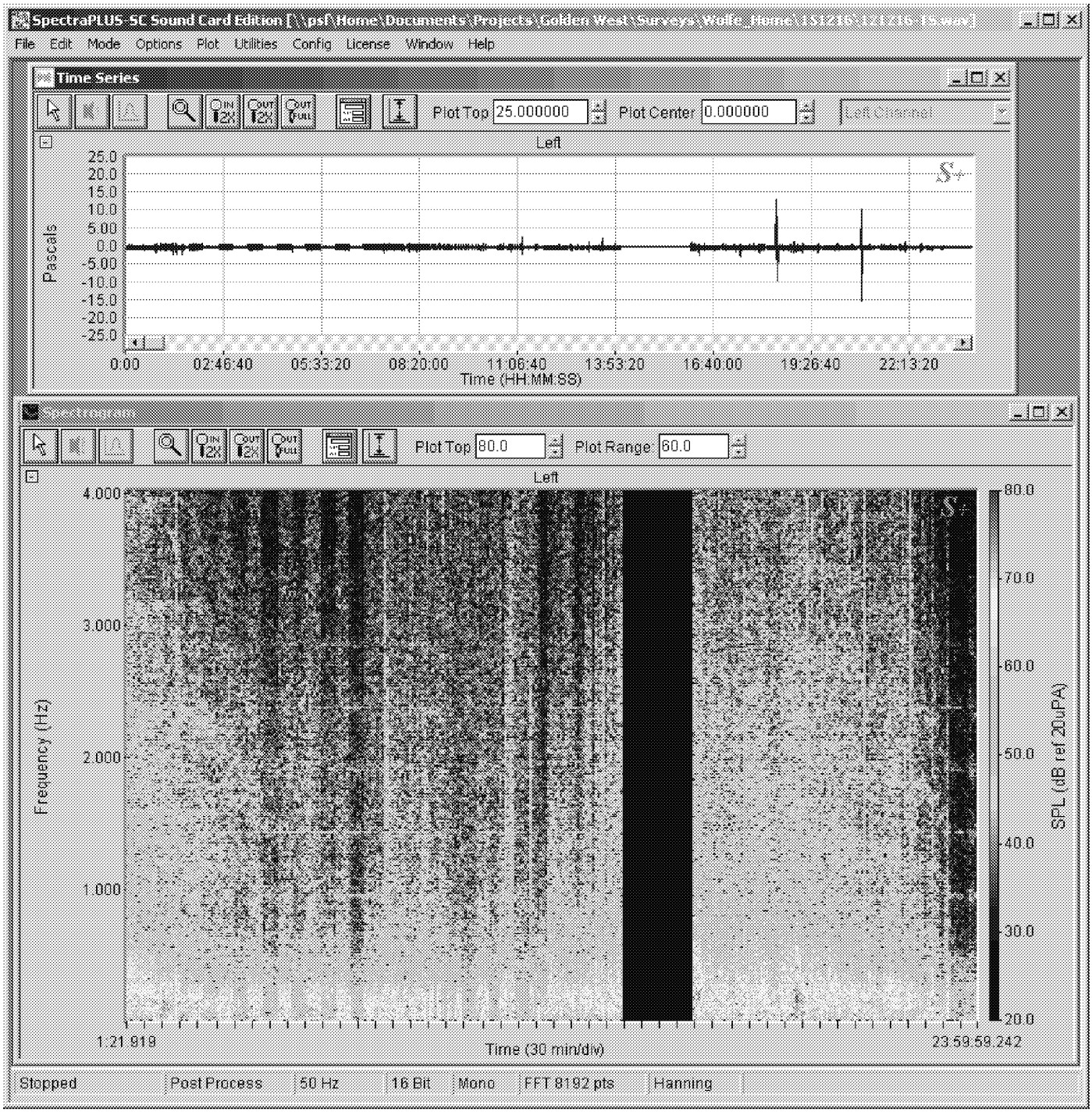
Note: Horizontal traces indicate wind turbine rotation. Rotation was observed at 0.48 Hz (9.6 rpm) prior to 2 AM rising to 0.79 Hz (15.8 rpm) until 9:30 AM when traces drop away. The 0.79 Hz trace harmonics were faintly visible between 12 PM and 6:20 PM and between 10 and 11 PM.

Location: WOLFE HOME
Date: 12/15/2015



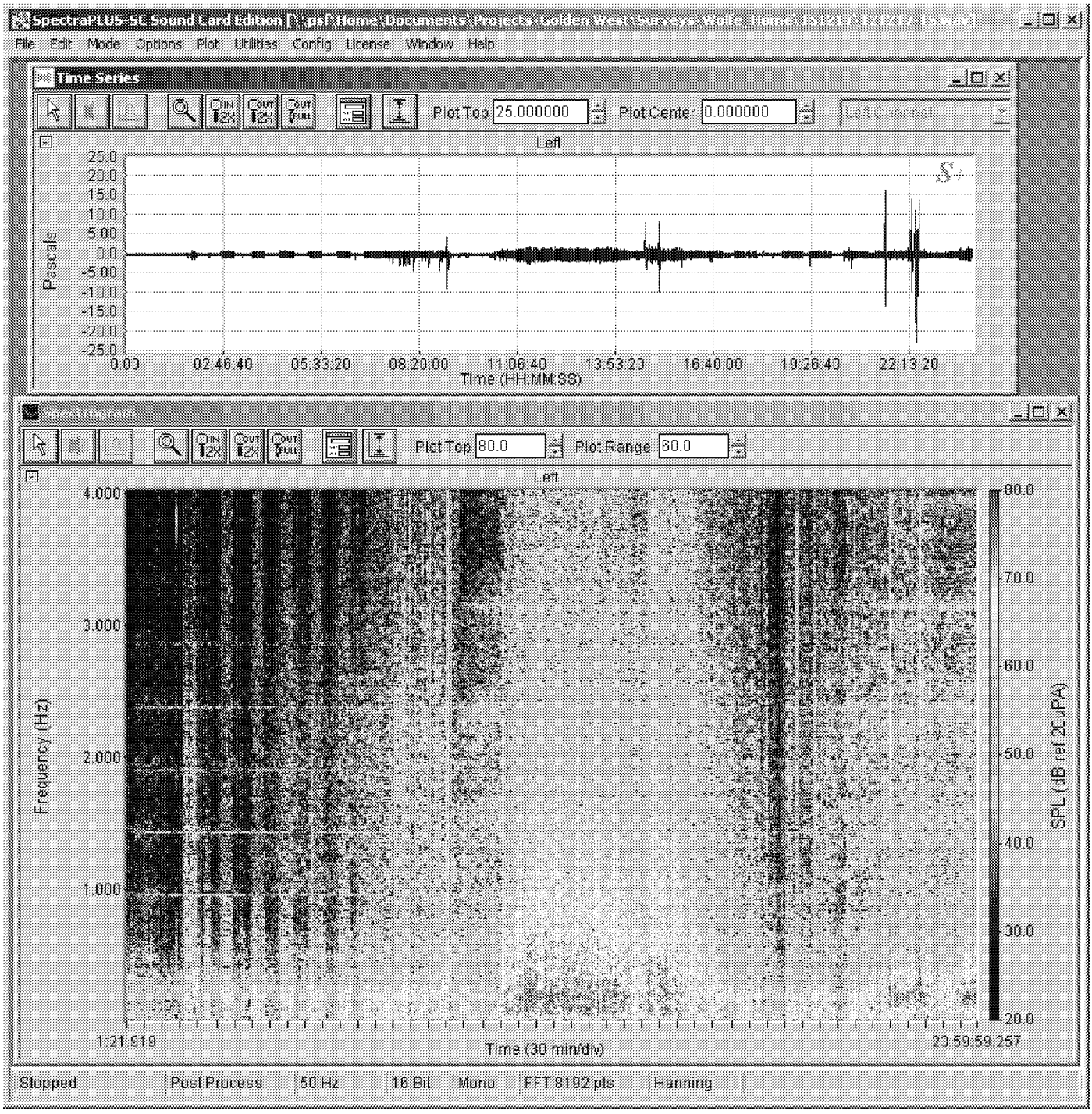
Note: Horizontal traces indicate wind turbine rotation. Rotation was observed at 0.79 Hz (15.8 rpm) throughout the day however high wind levels on the house obscured details in the mid-day.

Location: WOLFE HOME
Date: 12/16/2015



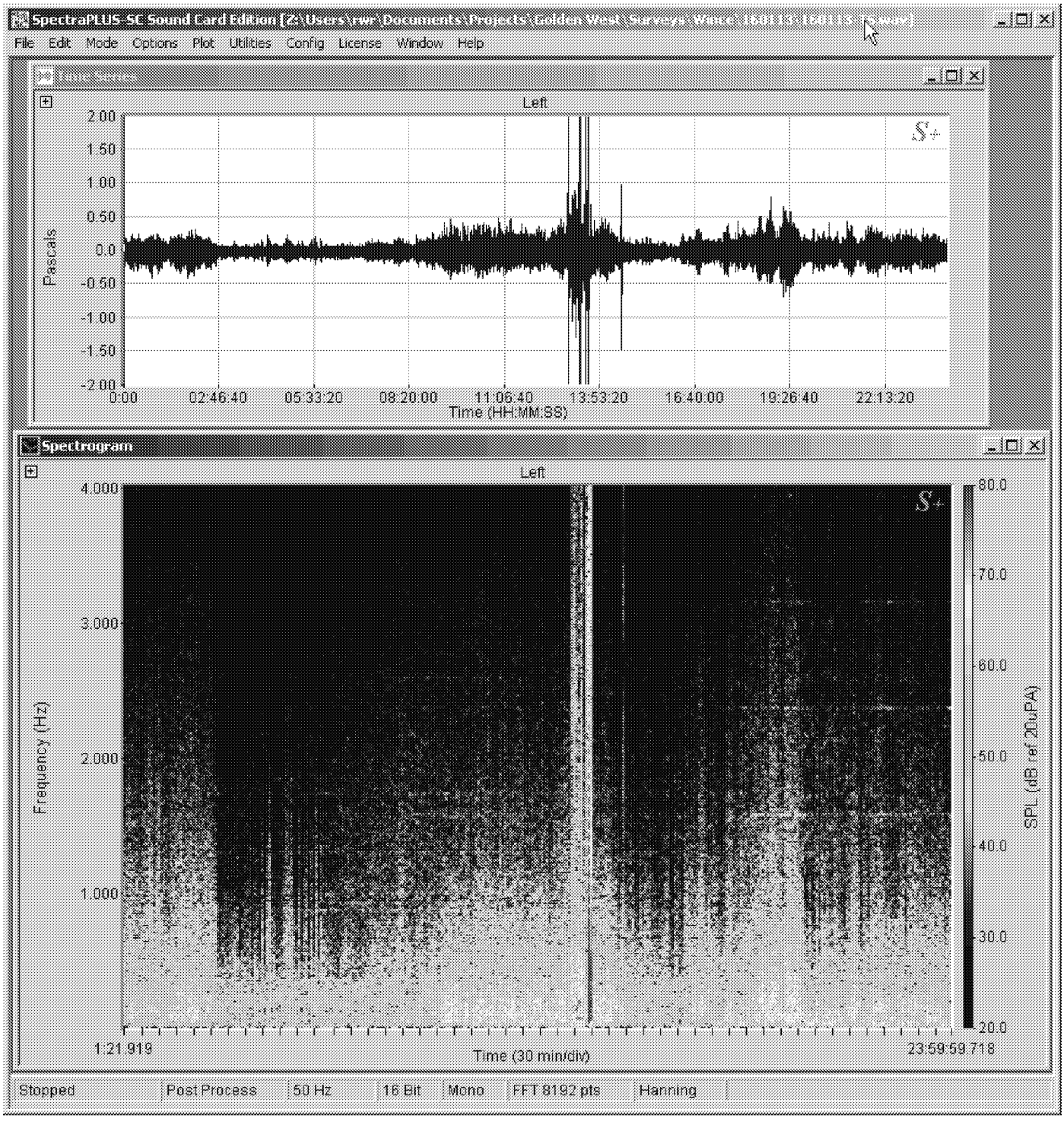
Note: Horizontal traces indicate wind turbine rotation. Rotation was observed at 0.79 Hz (15.8 rpm) until about 2:30 AM, then at 0.48 Hz (9.6 rpm) until the mid-morning. System maintenance was performed from 2 to 4 PM. Multiple variable rotation rates were observed in the afternoon. Rotations dropped to 0.48 Hz (9.6 rpm) after 11 PM.

Location: WOLFE HOME
Date: 12/17/2015



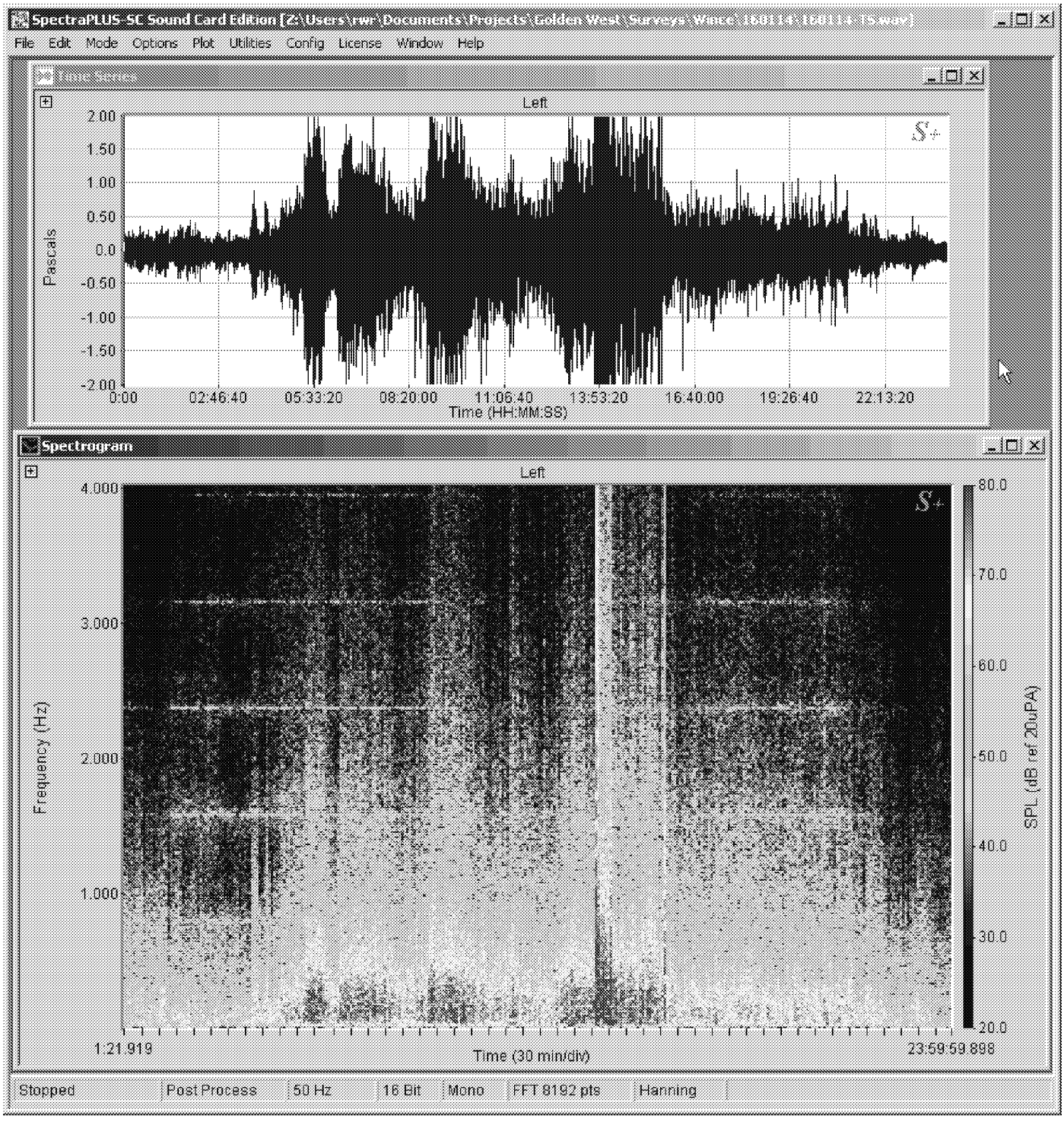
Note: Horizontal traces indicate wind turbine rotation. Rotation was observed at 0.48 Hz (9.6 rpm) until about 9 AM when rotations increased to 0.78 Hz (15.8 rpm). Rotations vanished after 6 PM, and then reappeared at 0.78 Hz (15.8 rpm) after 7:20 PM.

Location: WINCE HOME
Date: 1/13/2016



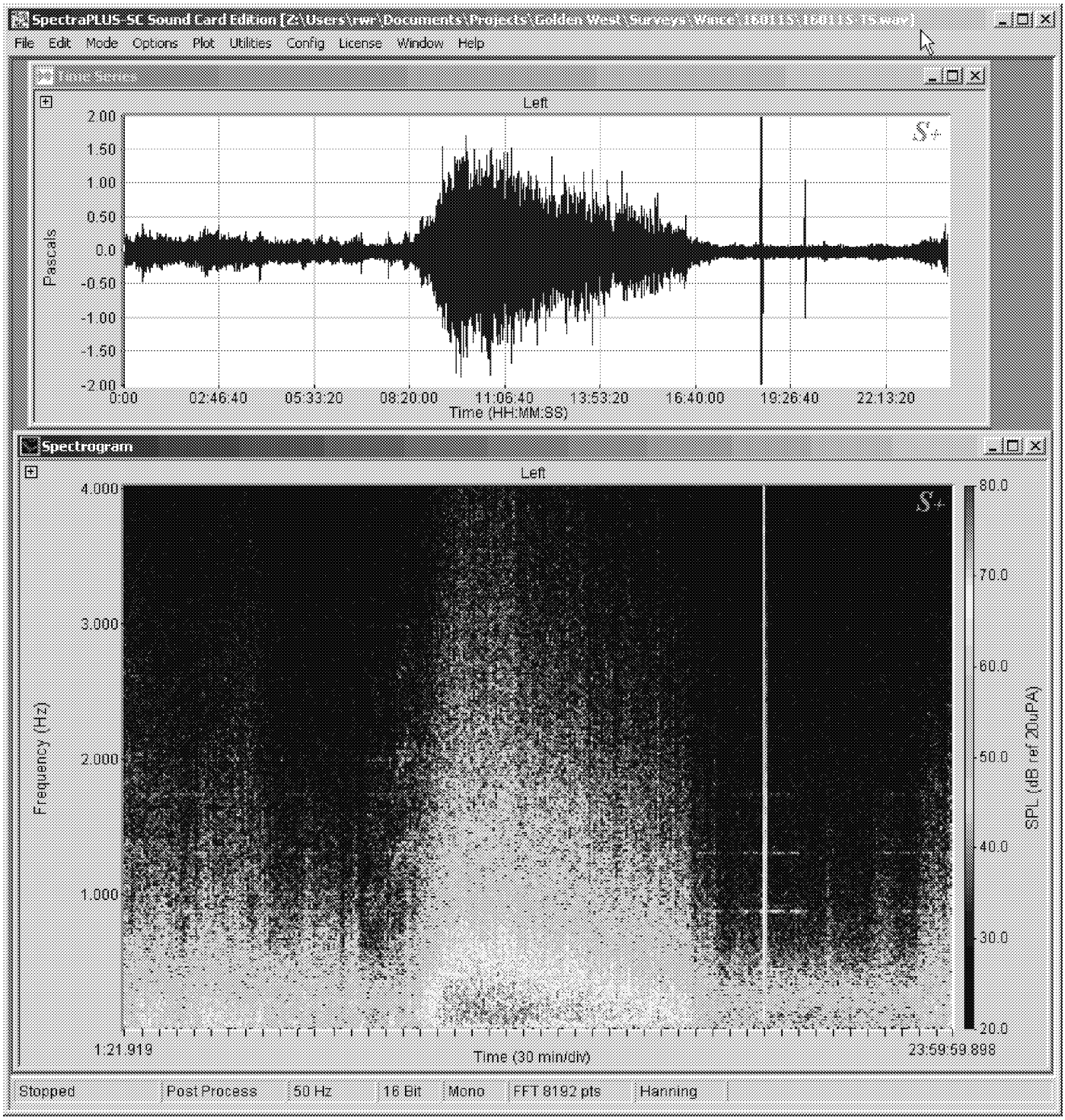
Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.79 Hz (15.8 rpm) observed. Traces consistent with wind direction; stronger when winds from W-NW, lighter when winds light or from other directions.

Location: WINCE HOME
Date: 1/14/2016



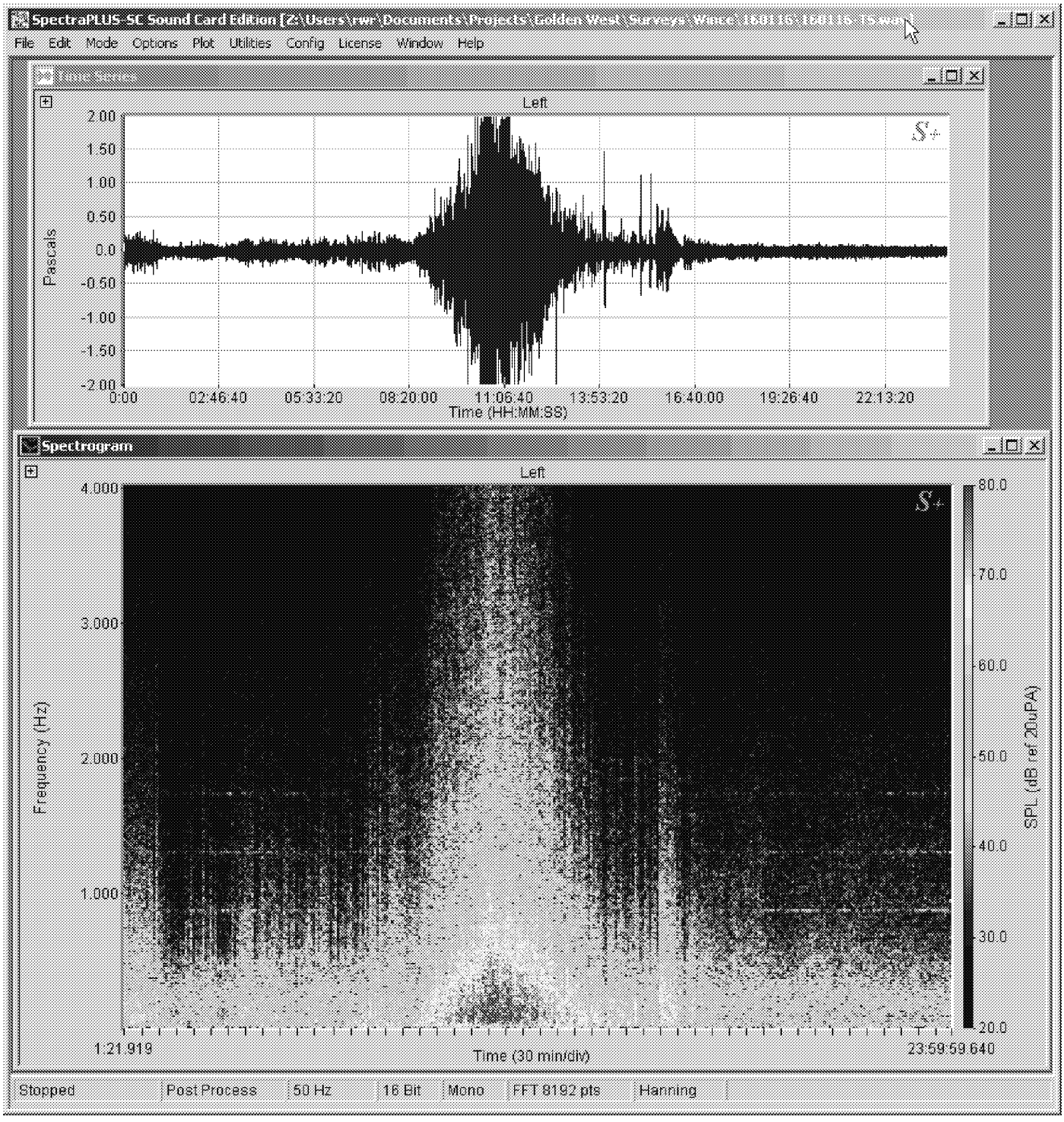
Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.79 Hz (15.8 rpm) observed. Traces consistent with wind direction; stronger when winds from W-NW, lighter when winds light or from other directions.

Location: WINCE HOME
Date: 1/15/2016



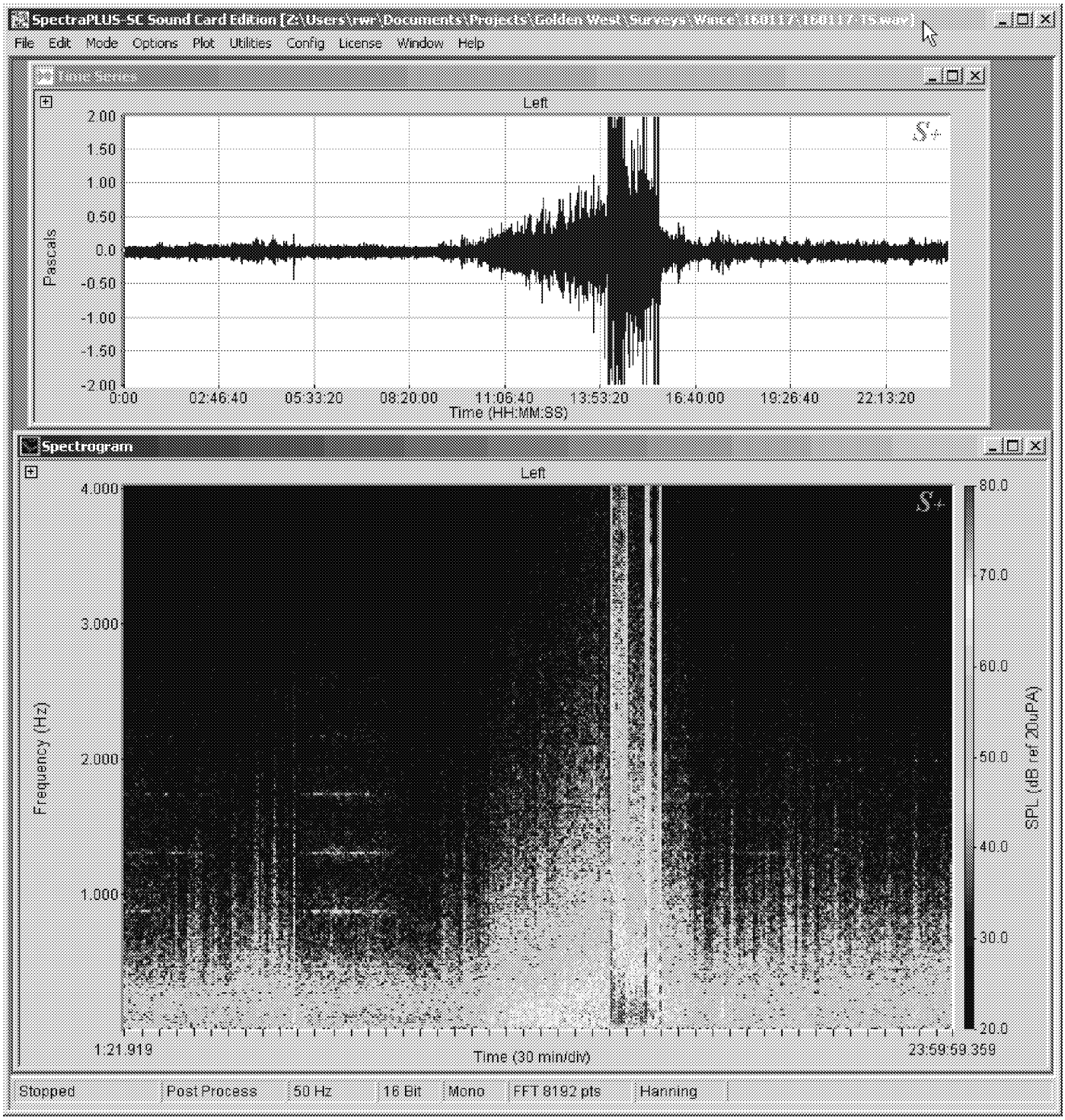
Note: Horizontal traces indicate wind turbine rotation. Winds mid-day from east to south to west, dropping in strength. Rotation at 0.43 Hz (8.6 rpm) observed with light or no winds on ground.

Location: WINCE HOME
Date: 1/16/2016



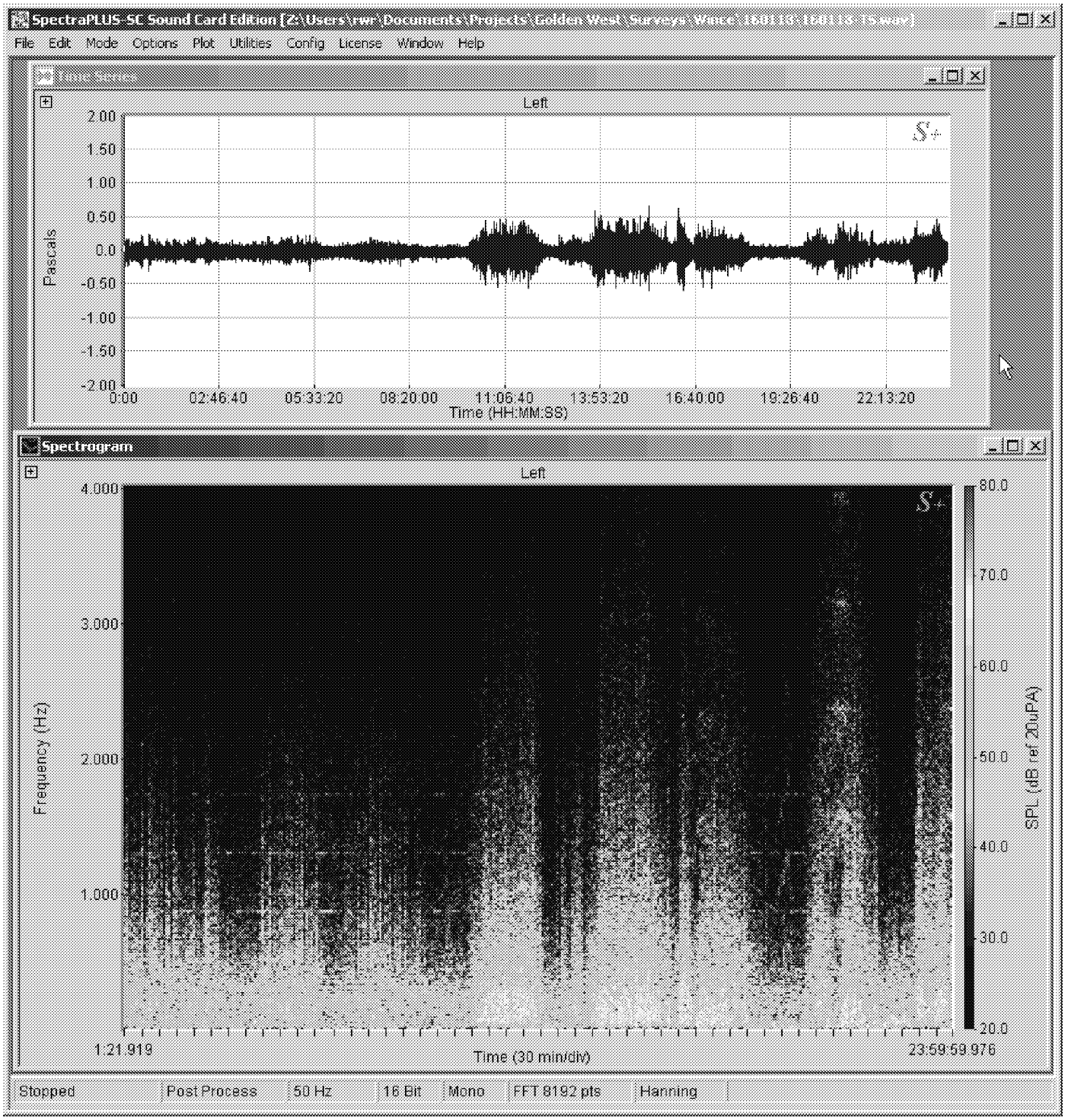
Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.43 Hz (8.6 rpm) observed.

Location: WINCE HOME
Date: 1/17/2016



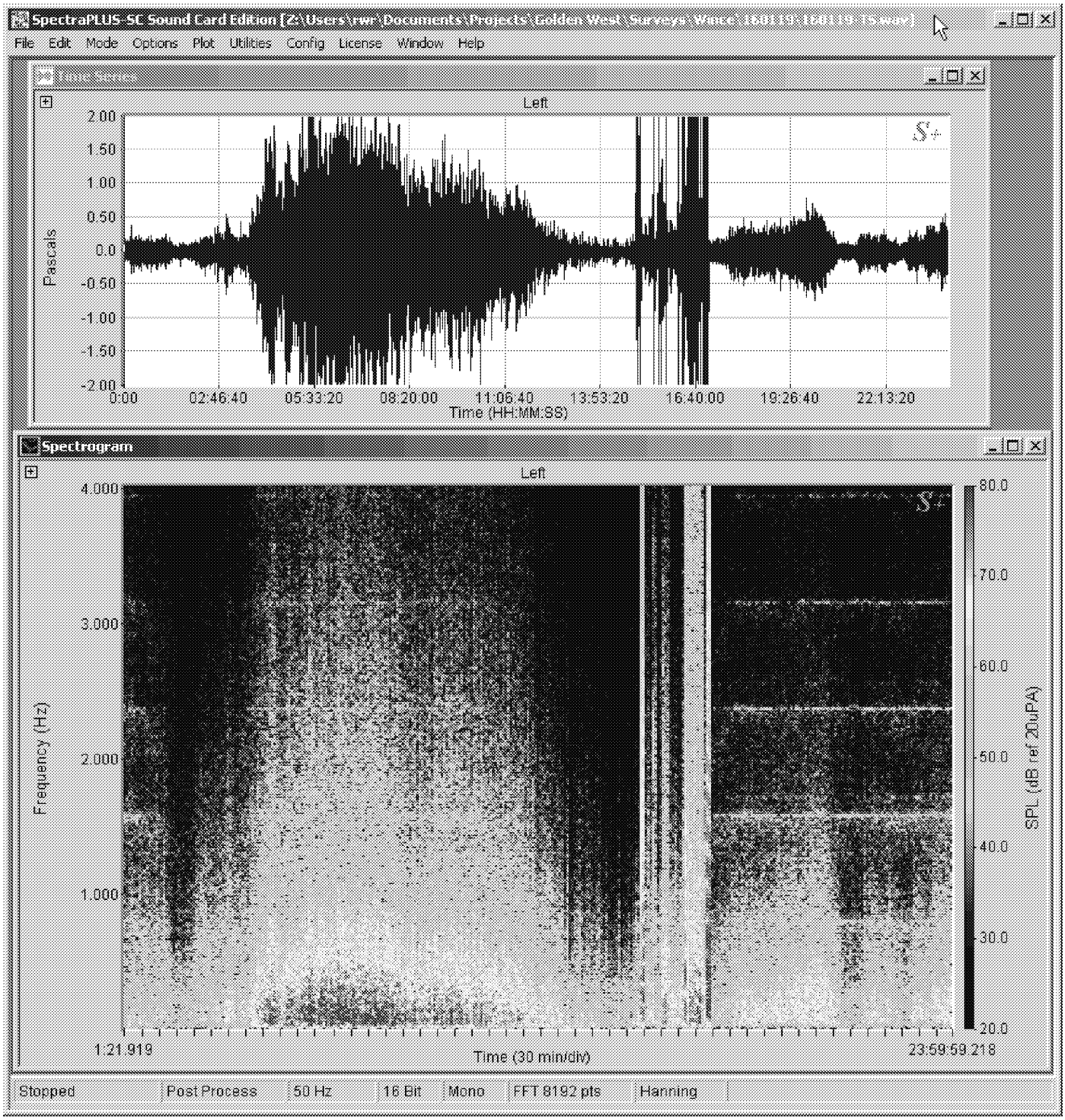
Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.43 Hz (8.6 rpm) observed.

Location: WINCE HOME
Date: 1/18/2016



Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.43 Hz (8.6 rpm) observed and a strong surge up to 0.79 Hz (15.8 rpm) in late evening.

Location: WINCE HOME
Date: 1/19/2016



Note: Horizontal traces indicate wind turbine rotation. Rotation at 0.79 Hz (15.8 rpm) observed during winds from W-NW.

Message

From: Jefferson, Catrice [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C02F0D4D513A4C93868B9090E90F4B2C-CJEFFERS]
Sent: 6/6/2017 3:28:13 PM
To: Lubetsky, Jonathan [Lubetsky.Jonathan@epa.gov]
Subject: fyi-noise

Ex. 5 Deliberative Process (DP)

Catrice Jefferson
Office of Air and Radiation/Office of Air Policy and Program Support (OAPPS)

Message

From: Fleming, Gregg G (Volpe) [Gregg.Fleming@dot.gov]
Sent: 7/23/2018 4:47:58 PM
To: James.M.Potter@hud.gov; Cointin, Rebecca <AWA> [rebecca.cointin@faa.gov]; Annette.Reichman@ed.gov; Jefferson, Catrice [Jefferson.Catrice@epa.gov]; Hileman, James <AWA> [james.hileman@faa.gov]; karen_trevino@nps.gov; Kevin.P.Shepherd@nasa.gov; Kurt_Fristrup@nps.gov; Marsan, Mehmet <AWA> [mehmet.marsan@faa.gov]; twerym@nhlbi.nih.gov; Sizov, Natalia <AWA> [natalia.sizov@faa.gov]; Stewart, Catherine M CIV USARMY MEDCOM APHC (US) [catherine.m.stewart20.civ@mail.mil]; Wall, Alan T CIV (US) [alan.wall.4@us.af.mil]; stephen.a.rizzi@nasa.gov; Jill.Schattel@va.gov; Doyle, Sean <AWA> [sean.doyle@faa.gov]; Solman, Gina (Volpe) [Gina.Solman@dot.gov]; Rizzi, Stephen A. (LARC-D314) [s.a.rizzi@nasa.gov]; Shepherd, Kevin P. (LARC-D321)[Distinguished Research Associates] [k.p.shepherd@nasa.gov]
Subject: RE: July 2018 FICAN Call
Attachments: FICAN_2018-07_MeetingSummary_DRAFTv2.docx; Environmental_Supersonic_Aircraft_20180717.pdf; 180626DraftWorkshopProgram-with speakers.doc

Folks –

Attached are the notes and related material from last week's FICAN telecom. Let me know if you have any edits.

Cheers,

Gregg

From: Fleming, Gregg G (Volpe)
Sent: Monday, July 16, 2018 12:44 PM
To: 'Potter, James M' <James.M.Potter@hud.gov>; Cointin, Rebecca <AWA> <rebecca.cointin@faa.gov>; 'Annette.Reichman@ed.gov' <Annette.Reichman@ed.gov>; 'jefferson.catrice@epa.gov' <jefferson.catrice@epa.gov>; Hileman, James <AWA> <james.hileman@faa.gov>; 'karen_trevino@nps.gov' <karen_trevino@nps.gov>; 'Kevin.P.Shepherd@nasa.gov' <Kevin.P.Shepherd@nasa.gov>; 'Kurt_Fristrup@nps.gov' <Kurt_Fristrup@nps.gov>; 'mehmet.marsan@faa.gov' <mehmet.marsan@faa.gov>; 'twerym@nhlbi.nih.gov' <twerym@nhlbi.nih.gov>; 'Natalia.Sizov@faa.gov' <Natalia.Sizov@faa.gov>; 'Stewart, Catherine M CIV USARMY MEDCOM APHC (US)' <catherine.m.stewart20.civ@mail.mil>; 'Wall, Alan T CIV (US)' <alan.wall.4@us.af.mil>; 'stephen.a.rizzi@nasa.gov' <stephen.a.rizzi@nasa.gov>; 'Jill.Schattel@va.gov' <Jill.Schattel@va.gov>; Doyle, Sean <AWA> <sean.doyle@faa.gov>; Solman, Gina (Volpe) <Gina.Solman@dot.gov>; Rizzi, Stephen A. (LARC-D314) <s.a.rizzi@nasa.gov>; Shepherd, Kevin P. (LARC-D321)[Distinguished Research Associates] <k.p.shepherd@nasa.gov>
Subject: RE: July 2018 FICAN Call

Folks –

Just a reminder that we have a FICAN telecom scheduled for tomorrow from 2-5pm EDT. The agenda will be as follows:

Ex. 5 Deliberative Process (DP)

And, we'll use the following call-in information:

Ex. 5 Deliberative Process (DP)

Cheers,

Gregg

-----Original Appointment-----
From: Fleming, Gregg G (Volpe)
Sent: Sunday, June 03, 2018 11:38 PM
To: Fleming, Gregg G (Volpe); Potter, James M; Cointin, Rebecca <AWA>; Annette.Reichman@ed.gov; jefferson.catrice@epa.gov; Hileman, James <AWA>; karen_trevino@nps.gov; Kevin.P.Shepherd@nasa.gov; Kurt_Fristrup@nps.gov; mehmet.marsan@faa.gov; twerym@nhlbi.nih.gov; Natalia.Sizov@faa.gov; Stewart, Catherine M CIV USARMY MEDCOM APHC (US); Wall, Alan T CIV (US); stephen.a.rizzi@nasa.gov; Jill.Schattel@va.gov; Doyle, Sean <AWA>; Solman, Gina (Volpe); Rizzi, Stephen A. (LARC-D314); Shepherd, Kevin P. (LARC-D321)[Distinguished Research Associates]
Subject: July 2018 FICAN Call
When: Tuesday, July 17, 2018 2:00 PM-5:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Telecon

Looks like this slot works. Blocking off the time. I will follow-up with an agenda, but let me know if there's any topics you'd like to include.

Message

From: Fleming, Gregg G (Volpe) [Gregg.Fleming@dot.gov]
Sent: 5/18/2020 2:54:21 PM
To: Cointin, Rebecca <AWA> [rebecca.cointin@faa.gov]; Annette.Reichman@ed.gov; Jefferson, Catrice [Jefferson.Catrice@epa.gov]; Hileman, James <AWA> [james.hileman@faa.gov]; karen_trevino@nps.gov; Kevin.P.Shepherd@nasa.gov; Kurt_Fristrup@nps.gov; Marsan, Mehmet <AWA> [mehmet.marsan@faa.gov]; twerym@nhlbi.nih.gov; Sizov, Natalia <AWA> [natalia.sizov@faa.gov]; Jim Potter [jimpotter1026@gmail.com]; Stewart, Catherine M CIV USARMY MEDCOM APHC (US [catherine.m.stewart20.civ@mail.mil]; Wall, Alan T CIV (US [alan.wall.4@us.af.mil]; stephen.a.rizzi@nasa.gov; Jill.Schattel@va.gov; Doyle, Sean <AWA> [sean.doyle@faa.gov]; Solman, Gina (Volpe) [Gina.Solman@dot.gov]; Rizzi, Stephen A. (LARC-D314 [s.a.rizzi@nasa.gov]; Shepherd, Kevin P. (LARC-D321)[Distinguished Research Associates [k.p.shepherd@nasa.gov]; Scata, Donald <AWA> [donald.scata@faa.gov]; Potter, James M CIV (USA [james.m.potter36.civ@mail.mil]; Melton, Chuck A [Chuck.A.Melton@hud.gov]; Tchaou, Marcel K [Marcel.K.Tchaou@hud.gov]; Zach Carter [zach.r.carter@hud.gov]; Walker, Judith <AWA> [judith.walker@faa.gov]; Ward, Vicki [vicki_ward@nps.gov]
CC: Fleming, Gregg G (Volpe) [Gregg.Fleming@dot.gov]
Subject: FICAN Meeting Notes (5_13_20)
Attachments: Supersonic Noise Cert Part 36 Briefing_FICAN.pdf; 20200513_NoiseLevelsPresentation_forFICAN.pdf; FICAN_2020-05_MeetingSummary_DRAFT_v1.docx

Folks –

Attached are the draft FICAN meeting minutes from our meeting last Wednesday (5_13_20), along with a copy of the two presentations that were provided. Please let us know if you have any edits; note that there is an open question in 2.c.ii.

Ex. 5 Deliberative Process (DP)

We will be circulating a Doodle poll for a meeting in the September/October timeframe.

Cheers,

Gregg

-----Original Appointment-----
From: Fleming, Gregg G (Volpe)
Sent: Friday, February 7, 2020 3:18 PM
To: Fleming, Gregg G (Volpe); Cointin, Rebecca <AWA>; Annette.Reichman@ed.gov; jefferson.catrice@epa.gov; Hileman, James <AWA>; karen_trevino@nps.gov; Kevin.P.Shepherd@nasa.gov; Kurt_Fristrup@nps.gov; Marsan, Mehmet <AWA>; twerym@nhlbi.nih.gov; Sizov, Natalia <AWA>; Jim Potter; Stewart, Catherine M CIV USARMY MEDCOM APHC (US; Wall, Alan T CIV (US; stephen.a.rizzi@nasa.gov; Jill.Schattel@va.gov; Doyle, Sean <AWA>; Solman, Gina (Volpe); Rizzi, Stephen A. (LARC-D314; Shepherd, Kevin P. (LARC-D321)[Distinguished Research Associates; Scata, Donald <AWA>; Potter, James M CIV (USA; Melton, Chuck A; Tchaou, Marcel K; Carter, Zach R; Walker, Judith <AWA>; Ward, Vicki
Subject: FICAN Telecon

When: Wednesday, May 13, 2020 10:00 AM-1:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Telecon

Folks –

Just a reminder that we have a FICAN Telecon scheduled for next Wednesday from 10am to 1pm (5/13).

Following is a proposed draft agenda for the meeting, along with the call-in/WEBX information:

1. Noise Levels Research Synthesis Presentation (HUD/Volpe)
2. Supersonics Coordination/Update (All)
3. Agency Approaches to Acoustic Data Archiving and Ready Access (NPS Lead)
4. Agency Updates (All)
5. AOB
6. Next Meeting

Please let me know if you have additional topics you'd like to have included on the agenda.

Cheers,

Gregg

>>>>>
Volpe Line 3

TELECONFERENCE

- US toll-free call in and passcode: (877)336-1839, 7300543; HOST PASSCODE: N/A
- International toll call in and passcode: (636)651-0008, 7300543

WEBEX

HOSTING (presents documents, chats, etc.):

- Go to website https://usdot.webex.com/meet/cindy.sabin
- Enter user first/last name (ex. Clay, Reherman)
- Enter host email cindy.sabin@dot.gov
- (next screen)
- Enter host username (cindy.sabin@dot.gov)
- Enter host password (Covid19!)
- (next screen)
- Website will automatically run Webex files and open meeting; host can upload documents for group viewing (Share App) and other functions

PARTICIPATING (views documents, chats, etc.):

- Go to website https://usdot.webex.com/meet/cindy.sabin
- Enter user first/last name (ex. Clay, Reherman)
- Enter user email (ex. clay.reherman@dot.gov)
- (next screen)
- Website will automatically run Webex files and open meeting; participant can view documents and chat/raise hand

>>>>>

Most have filled out the FICAN Doodle and this day/time is the consensus winner (no conflicts). So, I figured I'd send out an invite to hold the slot. Let me know if folks have any conflicts. Cheers, Gregg